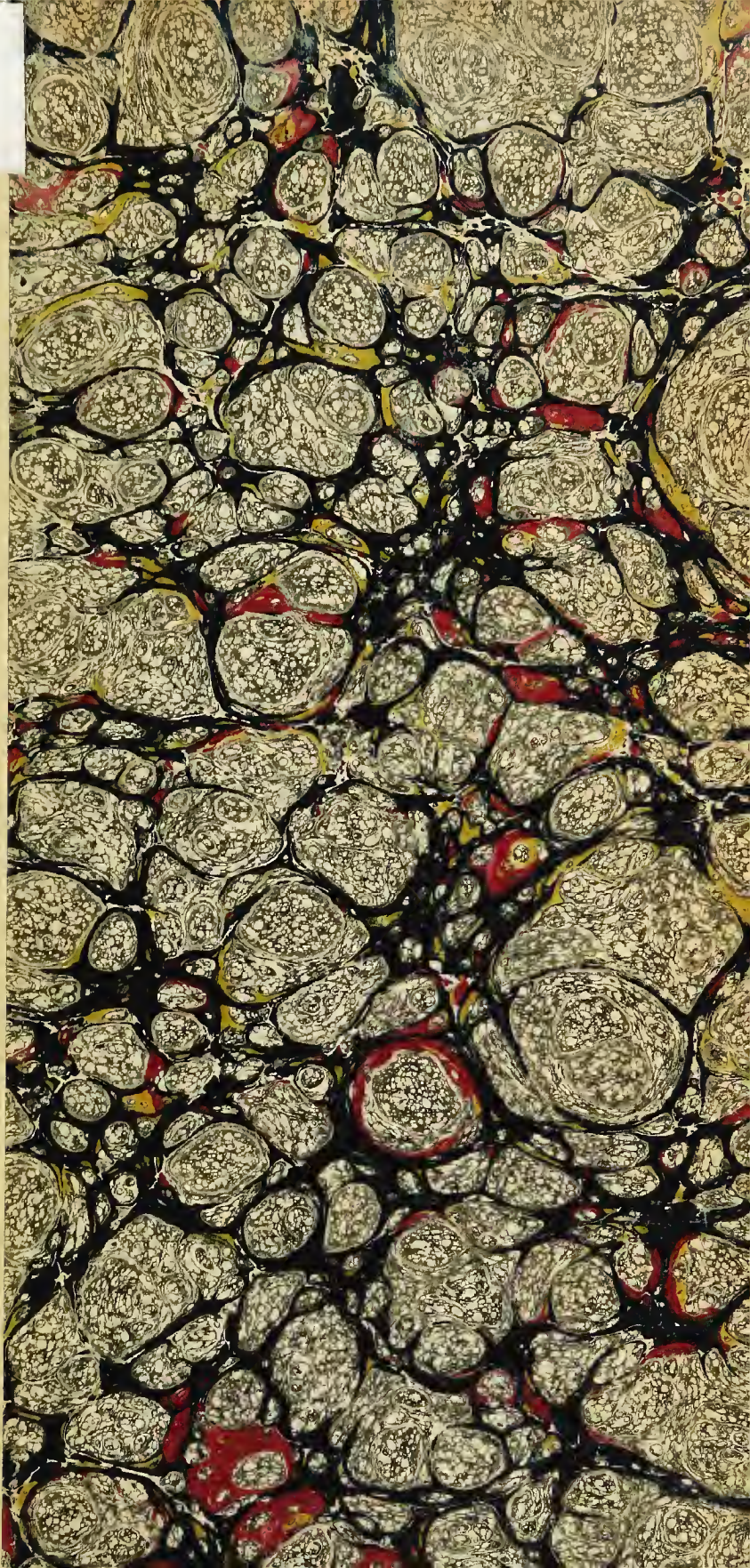
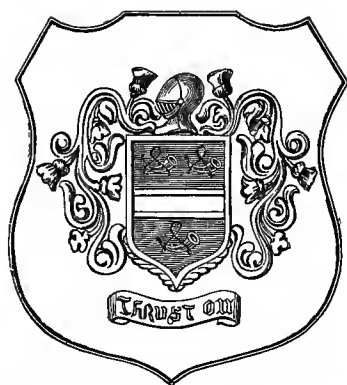


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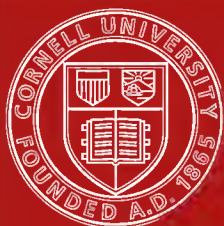
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Coaling, docking, and repairing facilities



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For *Prof. R. H. Thurston*

With the compliments of

R. P. Rodgers

THE OFFICE OF NAVAL INTELLIGENCE,

Bureau of Navigation,

Navy Department.

COALING, DOCKING,
AND
REPAIRING FACILITIES
OF THE
PORTS OF THE WORLD,
WITH
ANALYSES OF DIFFERENT KINDS OF COAL.

U.S. -
OFFICE OF NAVAL INTELLIGENCE,
BUREAU OF NAVIGATION,
NAVY DEPARTMENT,
1888.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.

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[CIRCULAR.]

BUREAU OF NAVIGATION, NAVY DEPARTMENT,
Washington, April 2, 1888.

Commanding officers of United States ships of war will, upon visiting foreign and home ports, embrace every opportunity to report without delay all errors and omissions which may occur in this publication, together with the corrections therefor, to the Chief of Bureau of Navigation, Navy Department.

All other persons who may use or be interested in this publication are requested to forward, to the above address, similar information.

J. G. WALKER,
Chief of Bureau.

P R E F A C E .

In the collection of the information herein contained, the form used in the Report on the Comparative Merits of Anthracite and Bituminous Coal for Naval Use (compiled in the Office of Naval Intelligence), has been adopted in Part I. Such corrections and additions have been made in the data of that report as have been noted from time to time in reports from cruising vessels and other official sources, and in naval, scientific, and commercial publications.

Part II contains analyses of different kinds of coal, in addition to the discussion of the relative merits of anthracite and bituminous coal, and memoranda on coal in Alaska, taken from the report above mentioned.

Part III is devoted to tests of coal. In tabulating these tests, where it was possible to obtain the data, the grate and heating surfaces of the boiler used are given, as well as the coal burned per square foot of grate, in order that an intelligible comparison may be made of the various tests of the same coal, and of those of the different kinds of coal.

Part IV contains a synoptical index of the coal, docks (or marine railways), and machine-shops, to be found in the several ports (alphabetically arranged), with the page of reference to Part I. The explanation of the symbols used will be found at the head of the index.

The information contained in this publication has been compiled and arranged by Assistant Engineer R. S. Griffin, U. S. Navy.

Attention is called to the circular of the Chief of Bureau of Navigation, on preceding page.

R. P. RODGERS,

Lieutenant U. S. Navy, Chief Intelligence Officer.

OFFICE OF NAVAL INTELLIGENCE,

BUREAU OF NAVIGATION, NAVY DEPARTMENT,

April, 1888.

Approved :

J. G. WALKER,

Chief of Bureau.

A.248875

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I.

**EXHIBIT OF COAL TO BE HAD AT THE PORTS OF THE
NORTH ATLANTIC, SOUTH ATLANTIC, PACIFIC,
ASIATIC, AND EUROPEAN STATIONS.**

8 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following Lake

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Collingwood, Ontario.	.....	Bituminous...	500	400 to 800	\$4.75; stowing, 20c. per ton.	Rapid; no interruption..
Owen Sound, Ontario.	.....	Steamboat....	1,000	700	\$4.60	do.....
Port Sarnia, Ontario.	Aug., 1883.	Anthracite ... Bituminous...	500 500	1,000 to 1,500	\$6.00 to \$7.00 3.00 Stowing, 23c. per ton.	Wheeled on board; slow.
Windsor, Ontario.	.....	.....	.....	.....	.....	.....
Detroit, Mich..	1887.	.....	.....	.....	.....	.....
Aroherstburg, Ontario.	.....	.....	.....	.....	.....	.....
Simcoe, Ontario	.....	(Stove) (Blacksmith) ..	60 50	 10-30	\$6.50 delivered	No facilities.....
Buffalo, N. Y...	Sept., 1884.	Bitu., Pa. Anthracite ..	Ample at all times. do.....	.....	\$2.75 5.25	.....
Cleveland, Ohio	Sept., 1884.	Bitu., Ohio.... Bitu., Pa.....	do..... do.....	.....	2.75 3.00	.....
Chicago, Ill....	Sept., 1884.	Illinois ... Indiana ... Pa. Anthracite ..	Bitu. do..... do..... do.....	.....	{ 2.50 2.50 3.25 6.75	.....
Erie, Pa	Sept., 1884.	Bituminous... Pennsylvania.	do.....	.....	2.75	Alongside wharf, by wheelbarrows. Moderately fast. Ice in winter will interrupt navigation.
St. Catherines, Ontario.	Sept., 1883.	Anthracite ... Bituminous...	Considerable.	.....	\$5.00 to 7.00	Good facilities

ports, together with the usual supply on hand, cost, etc.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.*	Machine shops at which steamers can repair.
None	10 to 15 feet...	None	Owen S'nd, Sault Ste. Marie.	One dry-dock, 325 by 60 by 14.	For all kinds of repairs.
None	10 feet	Not to any extent.	Collingwood.	One dry-dock, 300 by 60.	Two good shops.
None	30 feet	None	Amberst-burg, Windsor.	None	Two.
.....					
.....	.....	.....	.....	Four; 360 by 65 by 11; 300 by 57½ by 13; 235 by 51 by 9; 220 by 42 by 10.	All kinds of repairs.
.....					
None	None transported.	None	Port Dover	None	None.
None .....	.....	None	Erie	Four..... 347 by 62½ by 10. 280 by 44 by 15. 317 by 50 by 14. 280 by 40 by 11.	Excellent; 41 foundries and machine shops.
None .....	.....	None	Erie	One; 300 by 70 by 16	Excellent; 53 foundries and machine shops.
None .....	.....	None	Milwaukee	Four..... 285 by 50 by 12. 245 by 39 by 10. 305 by 50 by 14. 265 by 40 by 10.	Excellent; numerous and extensive; 133 foundries and machine shops.
None	10 to 15 yards.	None	Cleveland.	None	For ordinary repairs.
None	Coal on docks on bank of canal.	None. Coal comes from Erie.	Port Dalhousie on Welland Canal.†	One dry-dock, 150 by 26.	For small work.

* GENERAL NOTE.—In this column the first figures represent length; second, breadth; third, depth on sill.
† Coaling stations and dry-docks on new canal at Dalhousie, and at Port Colborne.

10 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following Lake ports,

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Chatham, Ontario.						
Hamilton, Ontario.						
Toronto, Ontario.						
Coburg and Port Hope Ontario.	Aug., 1883.	Anthracite ... Bituminous...	12,000 10,000	2,800	\$6 25 6 00 Free on board.	By carts; rapid; sometimes interrupted by ice in winter.
Belleville, Ontario.*	Sept., 1883.	Anthracite .. Bituminous (both from United States).	7,000 3,000	6,000	\$6 50 4 60 Delivered.	By barrows from sheds on docks; harbor closed in winter.

* At exceedingly high water vessels of 14 feet can enter harbor.

Exhibit of coal to be had at the following St. Lawrence River

Pietou and Kingston, Ontario.	Oct., 1883.	None Anthracite ... Bituminous...	500 400		\$6 00 5 50 Stowing, 25c. per ton.	By wheelbarrows; rather slow; never interrupted.
Montreal, Quebec.	Mar., 1888.	English..... Scotch..... Welsh..... Nova Scotia. Amer. anth., bituminous.	15,000 15,000	10,000 to 50,000 Mostly Amer. anth.	Soft \$3.20 to \$4.25, hard \$6; delivery and stowing, 75c.	Depends on size of vessels; facilities excellent; no interruption during the season of navigation.
Sorel, Quebec.						
Three Rivers, Quebec.	Aug., 1883.	None	None ...	None ...		

together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machinery shops at which steamers can repair.
.....					
.....					
.....					
None	300 feet for draught of 11 feet; $\frac{1}{2}$ mile for greater draught.	Not to any extent.	Newcastle	None	One at Port Hope, and one at Coburg.
None	50 to 100 feet for draught of 10 to 12 feet.	None	Deseronto, Trenton.	None. At Deseronto, 16 miles distant, dock and yard for small vessels, 150 to 200 tons register.	Two good works.

ports, together with the usual supply on hand, cost, etc.

None	40 feet	None	Gananoque	None	Indifferent facilities. Kingston has good facilities.
None	Short	None	Quebec (for large quantities).	Two dry-docks	Two connected with dry-docks; and numerous smaller ones along river front.
.....	(Those which can not come to city coal from piles at lower docks.)	.....	.....	The largest and only one really available for sea-going vessels is 300 by 45 by 10.	.....
None .....	.....	None	Quebec	None	None.
.....	.....	.....	Montreal.	.....	.....

12 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following St. Lawrence River

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Quebec, Quebec.	Sept., 1883.	Sydney	2,000	50,000	{ \$3.25 3.50 3.75 4.75 3.75 4.90 6.00 Stowing, 50c. per ton. Moderate	By lighters, 400 to 500 daily; liable to interruption for short time late in fall.
		Pictou	2,000			
		English	3,000			
		Welsh	4,000			
		Scotch	20,000			
		Welsh { Anth.	1,000			
		American. } }	18,000			
Gaspé Basin, Quebec.	July, 1884.	Pictou (bituminous).	Small...	Small...		
St. Hyacinthe,* Quebec.	Sept., 1883.	None				

* No coal for sale at Charlottetown, Georgetown, Summerside, or Souris, but can be had in case of emergency.

Exhibit of coal to be had at the following North Atlantic

Newcastle (Miramichi River), New Brunswick.	.....	Bituminous...	1,100	1,000	\$1 to \$5. Delivery and stowing, 40c. per ton.	By lighters from sheds; slow; not liable to interruption.
Tilt Cove, Newfoundland.	1884.	Welsh	200	200	\$6.25 from mining company.	Less than 18 feet, alongside wharf; otherwise by boats.
St. John's, Newfoundland.	Aug., 1883.	Nova Scotia .. Cardiff..... Anthracite (American).	9,000 } 2,000 } 500 }	12,000	{ \$4.50 to \$5.... { \$7 to \$7.50.... { \$7.50 to \$8.50. Delivered.	By lighters or from loaded vessels alongside; seldom interrupted; ice in February and March.
Harbor Grace, Newfoundland.	.....					
Amherst, Magdalen Island, Gulf of St. Lawrence.	July, 1884.	Bituminous...	Small...			
St. Pierre, Miquelon Islands.	.....	Anthracite } Sydney..... }	500	500	{ \$8..... { \$5.....	By lighters in summer; no supply on hand in winter.
Summerside, Prince Edward Island.	Aug., 1883.	Pictou..... Sydney.....	2,000 } 500 }	500	{ \$3..... { \$3.50..... Stowing, \$1 per ton.	Hauled in cars to wharf, then on board in tubs or baskets; slow; harbor frozen up from November till April.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	$\frac{1}{2}$ to $\frac{3}{4}$ mile to anchorage in stream; at wharf, a few feet.	None	Pictou, Nova Scotia.	One stone dry-dock 590 by 62; 7 floating docks 140 to 240 feet in length, capable of taking vessels 25 per ct. longer.	Several in city; very large works at Point Levi, opposite Quebec.
None			Pictou, Nova Scotia.	None	None.

Station ports, together with the usual supply on hand, cost, etc.

None	Less $\frac{1}{2}$ mile	None	Pictou, Nova Scotia.	None	None.
		Extensive.			
None	100 feet	Coal deposits not mined.	Harbor Grace.	One sectional, capacity 500 tons; 1 dry-dock, 610 by 84 $\frac{1}{2}$ by 25.	Two working, in a small way. Large works building, with dry-dock.
			St. John's.		
				None	
None	From wharf to roads, 1 mile.	None	Cape Breton.	None	None.
None on island.	$\frac{1}{2}$ to $\frac{3}{4}$ mile	None on island.	Pictou, Nova Scotia.	None	None on island.

14 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Charlottetown, Prince Edward Island.	July, 1884.	Picton..... Cape Breton.. Anthracite ...	Limited.	Small ...	.....	Frozen up in winter.....
Georgetown, Prince Edward Island.	1883.	None .....	.....	.....	.....	.....
Port Hood, Nova Scotia.	.....	None .....	.....	.....	.....	.....
Lingan, Nova Scotia.	.....	.....	.....	.....	.....	.....
North Sydney, Nova Scotia.	Aug., 1883.	Sydney	Unlimited.	.....	\$2.25 Free on board. Stowing, 6 to 10 cents per ton.	From loading pier, 1,000 tons per day. Interrupted from February to May.
Sydney, Nova Scotia.	July, 1884.	do	As required.	Average shipment 100,000 tons.	\$2.00 Free on board.	Coaling piers, chutes, and drops, 500 tons per day. No interruption, except by ice, from January to May.
Cow Bay, Nova Scotia.	June, 1883.	Bituminous...	1,000, 700 tons shipped daily.	10,000 in winter.	\$1.75 Free on board. At wharf. Stowing, 15 cents per ton.	From wharf 400 tons per day. From May to January.
Louisburg, Nova Scotia.	.....	....do	Unlimited.	Unlimited.	\$2.45 Stowed.	By chutes. Rapid. Vessels can lie alongside in any weather.
Port Joggins, Nova Scotia.	Aug., 1884.	Joggins	2,800	3,200	\$2.50	150 tons per day. No interruption.
Parrsborough, Nova Scotia.	Aug., 1884.	Parrsborough.	None kept on hand.	750 tons per day from mine.	\$3.25 Delivered at wharf.	By lighters at West Bay. Liable to interruption in January, February, and March by ice.
Farmonth, Nova Scotia.	Aug., 1884.	Soft anthracite	4,000 small for domestic use.	2,000	\$4.50	At wharf. Safe from storms.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine-shops at which steamers can repair.
			Pictou...	None	Yes.
None		Pictou, 40 miles.	Pictou...	None	None.
				None	
None	Very short...	By General Mining Association of London 120,000 tons output.	Sydney proper, 5 miles.	None. Marine railway 1,000 tons register capacity.	At Sydney mines; small one in town.
None	10 miles by rail to the mines.	2 collieries	North Sydney.	None	None.
None	Mines 1 mile distant and 1 mine 100 yards from wharf.	130,000 tons shipped annually.	Sydney. Louisburg.	None	At mines.
None	Mines are 21 miles distant by rail.	Reserve colliery.	Sydney in summer, Halifax in winter.	None	No regular facilities
None	$\frac{1}{2}$ to 1 mile ...	Joggins mines, 150 to 200 tons daily.	Dorchester, New Brunswick.	None	Yes.
None	3 miles from railroad wharf to deep water at West Bay.	27 miles distance by railroad. 750 tons per day; to be increased to 1,000.	Pictou...	None	None.
None	10 to 100 yards.	None	Halifax. St. John.	None	Nearly any kind of repairs done well.

16 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Arichat, Madame Island, Nova Scotia.	Nov., 1883.	None	None ...	None ...	.....	.....
Cape Canso, Nova Scotia.	Nov., 1883.	Picton	Small ...	Small ...	\$3 to \$4	.....
Port Mulgrave, Nova Scotia.	Nov., 1883.	Bituminous ...	Small ...	Small ...	.....	.....
Port Hawkesbury, Nova Scotia.	Nov., 1883.	None .....	.....	.....	.....	.....
Picton, Nova Scotia.*	Nov., 1883.	Bituminous ...	Unlimited.	100,000 to 150,000 output each colliery.	\$2.50 best screened, on wharf.	By chutes from elevated railways; rapid. Safe harbor for vessels up to 23 feet draught. Closed during winter months by ice.
Windsor, Nova Scotia.	Aug., 1884.	Bituminous. Anthracite ...	300 200	500	\$4.00 6.50	14 feet draught, at wharf; by tubs. By lighters 8 miles below, at all times.
Cornwallis, Nova Scotia.	.....	.....	.....	.....	.....	.....
Annapolis, Nova Scotia.	Aug., 1884.	Anthracite ... Bituminous ...	160 260	100	\$3.75 to \$4.50, delivery and stowing, 60 cents per ton.	Lighters and carts; 100 tons per day. Most liable to possible interruption in January.
Digby, Nova Scotia.	Aug., 1884.	None	None ...	300	\$4.50	20 feet draught at pier, from one-half tide to high water.
Barrington, Nova Scotia.	.....	.....	.....	.....	.....	.....
Shelburne, Nova Scotia.	.....	.....	.....	.....	.....	.....

*Coal supplied from Picton collieries at Richmond Station.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine-shops at which steamers can repair.
.....	.....	.....	Louisburg	None .....	.....
.....	.....	.....	Louisburg; Halifax.	None .....	.....
.....	.....	.....	Picton	None .....	.....
.....	.....	Small seam a few miles south.	Picton	Marine railway, 1,000 tons.	.....
None	At wharves, connected by railroad with collieries; 23 feet at wharf.	5 collieries with all improved facilities.	Sydney ...	None; 2 marine railways; capacity 1,000 and 1,200 tons register.	Iron foundry and machine-shops. A steam forge, engine and boiler works, 7 miles distant, connected by intercolonial railroad and by water.
None	50 feet. Vessels would ground at low water.	Nearest at Parrsborough, Port Joggins, Picton.	Parrsborough.	None	One at Windsor, one at Hantsport, 7 miles below.
.....					
None	$\frac{3}{4}$ mile to steamer lying in stream; 300 to 400 yards at wharf.	None	St. John, 60 miles on opposite side of Bay of Fundy.	None	Yes.
None	$\frac{1}{4}$ mile	None	Joggins...	None	None at present.
.....					
.....					

Halifax Harbor, at all times of year, for 80 cents per ton extra,

18 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Liverpool, Nova Scotia.						
Halifax, Nova Scotia.	Aug., 1887.	Nova Scotia .. American anthracite. Patent fuel ...	10,000 1,500	4,000 3,000	\$4.00 to \$6.00 5.00 to 7.00 \$5.50	By lighters; slow; no interruption.
St. John, New Brunswick.*	Sept., 1883.	Bituminous... Anthracite ...	5,040 2,271	6,100 2,700	6.00 Stowing, \$1 per ton.	By lighters; slow; no interruption.
St. Stephen, New Brunswick.	Aug., 1883.	Anthracite ...	800	400	\$6, delivered ..	By lighters; slow; ice in winter.
Portland, Me ..	Sept., 1884.	Anthracite, Pa. Cumberland, Md. Clearfield, Pa. Kanawha, W. Va. Nova Scotia.	Ample at all times. do. do. do. do.		\$4.75 3.75 3.75 3.75 3.75	
Portsmouth, N. H.	Sept., 1884.	Anthracite ... Cumberland ... Clearfield ... Kanawha ... Nova Scotia ...	do. do. do. do. do.		4.75 3.75 3.75 3.75 3.75	
Boston, Mass ..	Sept., 1884.	Anthracite ... Cumberland ... Clearfield ... Kanawha ... Nova Scotia ...	do. do. do. do. do.		4.60 3.85 3.75 3.75 3.75	At private coal dock or at navy-yard; by wheelbarrows.
Newport, R. I..	Sept., 1884.	Anthracite ... Cumberland ... Clearfield ... Kanawha ...	do. do. do. do.		4.40 3.50 3.50 3.50	From schooners alongside.
New London, Conn.	Sept., 1884.	Anthracite ... Cumberland ... Clearfield ...	do. do. do.		4.25 3.50 3.50	

* The ports of St. George, St. Andrews, Fredericton and

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
British, 5,000 tons Nova Scotia; also limited amount of Welsh.	$\frac{1}{2}$ mile from sheds to anchorage; coal also on wharves for immediate delivery.	Extensive at Pictou & Spring Hill; connection by rail	Pictou....	None. 1 marine railway—3,000 tons. Work commenced on granite dock May, 1886; to be finished in 4 years; will take H. M. S. <i>Inflexible</i> . Cofferdam.	Several. Naval station.
None	$\frac{1}{2}$ mile.....	None	Eastport, Maine.	None	One.
None	Small steamers come to wharf; large, coal 4 miles down the river.	None	Calais, Maine; St. John, N. B.	None for large vessels ..	None.
None	1 $\frac{1}{2}$ miles.....	None; connected by railroad with coal mines throughout U.S.	St. John New Brunswick; Portsmouth, N. H.	Two; 425 by 47 by 20-23, wood; 175 by 40 by 16, wood.	One, where engines are built.
U.S.; 656 tons anthracite.	2 miles to lower anchorage, off New Castle.	None	Portland; Boston.	At Kittery navy-yard; 1 wooden sectional dock; take vessel 350 by 80 by 23.	One large shop, also at navy-yard.
U.S.; 733 tons anthracite.	Very short; alongside of coal dock.	None	Portsmouth; Newport.	At Charlestown navy-yard, 1 stone dry-dock; take vessel 355 by 60 by 25. At East Boston, Simpson's docks take vessels (1) 352 by 64 by 17 $\frac{1}{2}$; (2) 250 by 45 by 17 $\frac{1}{2}$; (3) 153 by 32 $\frac{1}{2}$ by 13 $\frac{1}{2}$; 20 cents a ton; 16 each "lay-day."	Extensive and numerous. Navy-yard. Harrison Loring, Atlantic Works; 134 foundries and machine-shops.
U.S.; about 50 tons anthracite.	Schooners, alongside.	None	Providence; New London.	None	For small repairs, shops at marine railway.
.....	.....	None	New York.	None	Albertson & Douglass Machine Company.

Grand Manan possess no facilities for coal or repairs.

20 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tone on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
New York, N. Y.	Oct. 1887.	Anthracite ...	Ample at all times.		\$3. 75	Alongside dock at navy-yard; or at Twenty-third street, East River, at pier.
		Cumberland	do.....		3. 60	
		Clearfield	do.....		3. 50	
Jersey City, N. J.	1887.	Anthracite ...	do.....			
		Cumberland	do.....			
Wilmington, Del.	1887.	Anthracite ...	do.....			
		Cumberland	do.....			
Philadelphia, Pa.	Mar., 1888.	Anthracite ...	do.....		3. 75	
		Clearfield	do.....		2. 75	
		Cumberland	do.....		2. 35	
					f. o. b. at Port Richmond.	
Camden, N. J.	1887.	Anthracite ...	do.....			
		Cumberland	do.....			
Baltimore, Md.	Mar., 1888.	Cumberland	do.....		2. 60	
		Clearfield	do.....		2. 75	
		Anthracite	do.....		4. 50	
					f. o. b. at Locust Point or Canton Pier.	
Newport News, Va.	Mar., 1888.	Kanawha	do.....		Same as Baltimore prices.	Alongside railroad wharf.
Norfolk, Va....	Sept., 1884.	Kanawha	do.....		3. 00	At dock at navy-yard, Gosport; off Fort Norfolk by lighters; or alongside railroad wharf.
		Anthracite	do.....		4. 00	
		Cumberland	do.....		3. 25	
		Pocahontas	do.....			
Wilmington, N. C.	Sept., 1884.	Kanawha	do.....		3. 50	
		Cumberland	do.....		3. 50	
		Clearfield	do.....		3. 50	
		Anthracite	do.....		4. 50	
Charleston, S. C.	Sept., 1884.	Cumberland	do.....		3. 50	Alongside dock
		Clearfield	do.....		3. 50	
		Anthracite	do.....		4. 50	

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
U.S.; 320 tons anthracite.	-----	None	Perth Amboy.	One at Brooklyn navy-yard; dock will take vessel 350 by 65 by 25; another building, 500 by 85 by 25½; 2, Erie Basin, Brooklyn, will take vessels 510 by 70 by 22, and 567 by 56 by 25; 4 floating docks, New York, largest take vessel 400 by 95 by 19; charges, 20 cents per gross ton first day, 15 thereafter; 2 marine railways, Brooklyn, 1,200 and 1,400 tons.	Extensive and numerous. De la-mater Iron Works, Fletcher, Harrison & Co.; Quintard Iron Works; Morgan Iron Works; also at navy-yard, Brooklyn; 287 foundries and machine shops.
-----	-----	None	New York.	Several balance docks; largest, 185 by 62½ by 14, 1,200 tons.	Several.
-----	-----	None	Philadelph'a	H. & H. Co.'s, 334 by 90 by 13½; 2 marine railways.	Excellent.
None	-----	None	Wilmington; Chester.	One wooden Simpson's patent for vessels 425 by 55 by 21½; 1 sectional, 200 by 62 by 14; charges, 20 cents a ton; 2 marine railways; length of cradles, 160 and 170.	Extensive & numerous. Birly, Hillman & Streaker; Neafie & Levy; Cramp & Son. Also at Chester.
-----	-----	None	Philadelph'a	One sectional, 210 by 70 by 17.	Yes.
None	-----	None	Annapolis; Newport News.	One, wooden, Simpson's patent (free for U. S. men-of-war), for vessels, 435 by 50 by 21; 1 wooden sectional, will take Galena class; 2 marine railways, capacity 700 tons; marine slips, No. 1, capacity 1,200 tons; floating dock of 1,500 tons displacement.	Yes. 63 foundries and machine shops.
-----	-----	None	Norfolk ..	One building 600 by 93 by 25.	None.
U. S.; 1,167 tons anthracite; 4 tons bituminous.	To Fort Norfolk from navy-yard, 1½ miles.	None	Baltimore; Newport News.	One stone dry-dock at Gosport navy-yard, will take vessel 290 by 60 by 25; another building (timber) 500 by 85 by 25½.	At navy-yard, Gosport; excellent.
None	-----	None	Charleston.	Marine railway—1,600 tons.	Cape Fear machine-shop.
None	½ to 1 mile.	None	Port Royal.	One wooden floating dock, 155 by 49 by 11.	Charleston Iron Works, and Valk & Murdock.

22 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Port Royal, S.C.	Sept., 1884.	Cumberland ..	Depends on demand		\$3. 75	-----
		Clearfield ..			3. 75	
		Anthracite ..			4. 75	
Savannah, Ga..	Sept., 1884.	Cumberland ..	Ample supply.....		4. 00	Alongside dock; slow...
		Clearfield.....			4. 00	
		Anthracite ..			5. 00	
Key West, Fla.	Mar., 1888.	Anthracite ...	700	700	4. 35	Alongside Government wharf.
Pensacola, Fla.	Sept., 1884.	Cumberland ..	Depends on demand		4. 50	At coal dock at navy-yard, with draught of 18 feet.
		Clearfield.....			4. 50	
		Anthracite ..			6. 00	
Mobile, Ala....	Sept., 1884.	Alabama.....	Ample supply.....		4. 00	-----
		Pittsburgh via New Orleans.			6. 50	
		Anthracite ..			7. 50	
New Orleans, La.	Sept., 1884.	Pittsburgh ...	Ample at all times		4. 00	By lighters.....
		Alabama ..			3. 75	
		Anthracite ..			7. 00	
Galveston, Tex.	Sept., 1884.	Cumberland ..	Depends on demand		5. 50	-----
		Anthracite ..			7. 50	
St. George's, Bermuda.	Sept., 1883.	Cardiff.....	600	400	8. 60	In port by wheelbarrows; rapidly. At Murray's anchorage, from hulks, by baskets or hoisting; rarely interrupted by storms.
		Anthracite ..	150	75	9. 60 Stowing, 36 to 48c. per ton.	
Hamilton, Bermuda.	Apr., 1887.	English.....	1, 200	1, 000	\$4. 79 (English Government contract price).	Ten tons per hour from hulk. Winter gales interrupt.
*Nassau, Bahama Islands.	Mar., 1884.	Anthracite ...	200	200	-----	Large vessels must load outside of bar by lighters. Slow. Considerable risk from June to October.
Bahia Honda, Cuba.	Feb., 1884.	None	-----		-----	-----
Cabaños, Cuba.	Feb., 1884.	None	-----		-----	-----

* No coal regularly on hand. This was taken from a

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None .....	.....	None	Savannah	None	
None .....	.....	None	Port Royal; Brunswick, Ga.	One 340 by 75 by 13 (3,000 tons); marine railway, 1,200 tons.	J. W. Tynan.
U. S. ....	.....	None	Pensacola	None	Light repairs.
U. S.; 725 tons anthracite.	.....	None	Key West; Mobile.	At navy-yard, 1 iron sectional dock, unfinished.	At navy-yard.
None .....	.....	None	Pensacola; New Orleans.	One for vessels of 1,000 tons.	Gulf City Foundry. Home Industry Foundry, Lang, John & Company. Schnemann, A.
None	$\frac{1}{2}$ mile to coal yard.	None	Mobile	Three: 315 by 42 by 16; 225 by — by 16; 226 by — by 14.	Extensive and numerous. 20 foundries and machine shops.
None .....	.....	None	N. Orleans.	None	Dallas Iron works. Lee Iron Works.
British, at dock-yard, $13\frac{1}{2}$ miles dist.; 3,000 to 4,000 Welsh on hand.	60 feet	None	"Grassy Bay."	None. Marine slip, 1,200 tons.	One small shop. At dock-yards are extensive works capable of any kind of repairs.
British, 4 miles from town. 6,000 tons Welsh. Vessels go alongside coal wharf.	Depends on anchorage and kind of coal required.	None	St. George's	None. One floating dock. Capacity largest English iron-clad.	Well equipped shops at Government dock-yard. Repairs cost actual price of labor and materials plus 25 per cent.
None	2 miles	None	Havana; Key West.	None. One marine railway for vessels of 1,200 tons.	For very small repairs.
.....	.....	.....	.....	None	None.
.....					

wrecked vessel in 1868 and exposed to the weather.

24 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Maríel, Cuba ..	Feb., 1884.	None .....	.....	.....	.....	.....
Havana, Cuba *	Jan., 1884.	Cardiff..... Cumberland .. Anthracite ... Newcastle Blacksmith ...	20,000 } 6,000 } 1,000 } 4,000 } 500 }	80,000 } to } 100,000 }	{ \$9.00 to \$10.00 8.00 to 8.00 8.50 8.00 to 9.00 9.00 to 0.90 Stowing, 15c. to 20c. per ton (Spanish gold).	Alongside wharf or by lighters, 400 tons per day; heavy rains and storms from June to October.
Matanzas, Cuba	Aug., 1883.	English.....	3,000 to 3,500	3,250	\$8.00 to \$9.00 Stowing, \$1.00 per ton.	By lighters; slow
Cardenas, Cuba	Jan., 1884.	American..... Scotch..... British Provinces.	400 } 600 } 500 }	4,000	\$11.00 to \$12.00 Alongside, \$2 per day to laborers (Spanish gold).	By baskets to lighters, and then in tubs to ships; 500 lbs. each; very slow; liable to interruption from strong northerly winds and hurricanes in September to February.
Sagua la Grande, Cuba.	.....	(t)				
Nuevitas, Cuba	Feb., 1884.	None	None ..	Unknown		
Port Nipe, Cuba.	Feb., 1884.	None				
Baracoa, Cuba.	Feb., 1884.	.....	Small quantity.	Small quantity.		
Guantanamo, Cuba.	.....	None	None ..	None ..		
Santiago de Cuba.	Oct., 1883.	Anthracite ... Cardiff..... Cumberland .. Scotch	3,500 } 9,500 } 2,600 } 1,500 }	17,000 }	{ \$8.00 to \$8.50 8.50 to 9.00 8.00 to 8.50 8.00 to 8.25 Stowing, 50c per ton (Spanish gold).	By lighters and tugs; rapid; no interruption.
Trinidad de Cuba.	Sept., 1883.	American bituminous.	550	900	\$8.50 to \$9.00 on wharf.	On the wharf; rapid; in the stream by lighters; delay according to wind; interruption during Sept. and Oct.

* Coal can be obtained at Matanzas, Cardenas, and Sagua la Grande, but no Cardiff or Cumberland.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pits to ship.	Coal mining in vicinity.	Next nearest coal-ing port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	None	None	None	None	None
None	If alongside wharf, a few yards.	None on island.	Santiago de Cuba, Cienfuegos.	One floating dock, 275 feet by 78 by 14½ (16 feet at bow, 13 at stem). Dock is open ended; 75 cents per ton register first day; 25 there after.	Several.
None	One mile.....	None	H a v a n a (best)	None	None.
None	Twelve miles if drawing more than 15 feet; 1 mile with less draught.	None	Matanzas.	None	One.
Small quantity, very poor quality, belonging to Government.	None	None	None	None	None
None	None	None	None	None	None
None	None	None	Santiago de Cuba, Gibara.	None	None.
None	None	None	None	None	None.
None	300 yards	None. (There are unworked veins.)	Cienfuegos	None	One good shop capable of all repairs.
Spanish at Casilda; about 500 tons American bituminous.	3 miles, according to draught.	None.....	Cienfuegos	None	One.

† Can be obtained.

26 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Cienfuegos, Cnba.	Feb., 1888.	Cardiff..... Cumberland .. Anthracite ... Westmoreland Newport.....	3,000 2,000 2,000 1,500 2,500	After April and May, 6600. In first part of y'r 11,500.	{ \$8.50 9.00 8.00 8.00 8.50 8.00 Spanish gold.	By lighters; rapid; 200 tons per day; seldom interrupted; probably most liable in Sept. and Oct.
Kingston, Jamaica, W. I.*	Jan., 1886.	Cardiff.....	27,000	20,000	\$9.70.....	From wharf, with baskets of 80 pounds each; rapid; no interruption.
San Domingo, W. I.†	Sept., 1883.	A few hundred tons for Clyde S. S. Co.				Interrupted from Aug. to Nov.
Azua, San Domingo Island.						
Cape Haytien, Hayti, W. I.	Jan., 1884.	Welsh.....	Small...	Small...	\$13.00 to \$14.00	By lighters.....
Port-au-Prince, Hayti, W. I.	Jan., 1884.	Welsh (Gov't depot).	Small...	Small...	\$16.00 to \$18.00	By lighters.....
Gonaives, Hayti, W. I.						
Jeremie, Hayti, W. I.						
San Nicolas, Hayti, W. I.	Jan., 1884.	None.....				
St. Marc, Hayti, W. I.		None.....				One-eighth mile from shore in 8 to 15 fathoms; no wharves.
Samana, W. I.	Oct., 1883.		Small, for Clyde steamers.		Not for sale...	By baskets; rapid; no interruption.
Puerto Plata, San Domingo.	Feb., 1884.	None.....	None...	None...		

* There are no other coaling ports on the island.

† Las Calderas on the south, and Samana on north side of island would make excellent coaling stations.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coal-ing port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	Coal at wharf; small vessels go alongside; large vessels lie $\frac{1}{2}$ mile.	None	Trinidad.	None; 2 slips, largest takes vessels 200 feet long, and draught 8 feet forward and 12 feet aft.	Two works.
British at Port Royal; 1,800 Welsh, 1,000 patent fuel.	30 to 40 yards.	None	Santiago de Cuba.	None	Several, where machinery can be repaired with dispatch. Mechanics, negroes.
None .....	.....	None	St. Juan, Port Rico, St. Thomas	None	None.
.....					
None † .....	.....	.....	Port Royal, Kingston, St. Thomas.	None	None.
Gov't coal only; small quantity.	.....	.....	Santiago de Cuba.	None	None.
.....	.....	.....	do .....	.....	.....
.....	.....	.....	do .....	.....	.....
.....	.....	.....	do	None	None.
None .....	.....	None	Port-au-Prince.	None	None.
None	40 feet	None	San Juan, Porto Rico.	None	None.
None .....	.....	None	St. Thomas	None	None.

† The United States station during the war was sold in 1873.

28 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling; rapid or slow, etc.
Mayaguez, Porto Rico, W. I.	Feb., 1886.	None	None ...	None ...		
Ponce, Porto Rico, W. I.						
Arecibo, Porto Rico, W. I.						
Gnayaama, Porto Rico, W. I.						
Naqabao, Porto Rico, W. I.						
Viequez Island, Porto Rico, W. I.						
San Juan, Porto Rico, W. I.	Feb., 1886.	Cardiff.....	3,000	1,500 to 2,000.	\$9.00	By lighters and baskets; rather slow.
Turk's Island, W. I.	Sept., 1883.	None	None ...	Only what is saved from wrecked vessels.		
St. Thomas, W. I.*	Jan., 1887.	Cardiff..... Scotch..... Newcastle Comberland .. German..... Anthracite ...	2,500 450 600 450 250 600	} 7,500 {	\$7.50 to \$8.00 7.50 9.75 7.50 7.00 8.00	At wharf with baskets, as rapidly as it can be stowed. No interruption except possibly by hurricanes from Aug. to Nov.
					Delivered at wharf. Lighters 50 cents more; stowing 10 cents per ton.	
Frederiksted, Santa Cruz, W. I.	Dec., 1885.	Newcastle Cardiff.	Small ...	400 to 500	\$8.00 to \$9.00; lighters extra.	By lighters.....
Christianstadt, Santa Cruz, W. I.	Dec., 1885.	Cardiff.....	Small ...	500	\$8.00 to \$9.00; lighterage, \$1 to \$2 per ton.	do.....

* Santa Cruz has no facilities. At St. Thomas the Royal Mail, Imperial German, and the Com-

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machoe shops at which steamers can repair.
None		None	San Juan, Porto Rico.	None	None.
.....					
.....					
.....					
.....					
.....					
None on isld	Short	None	St. Thomas	None	None.
None		None	St. Thomas	None	None.
None	25 feet of water at coal pier; steamer of greater draught can coal from pier by using staging.	None	San Juan, Porto Rico.	None	Shops of Royal Mail Steam Packet Co.
.....			St. Thomas	None	None.
.....			St. Thomas	None.	.....

pagnie Générale Transatlantique keep on hand sufficient coal to supply their steamers.

30 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Basse-Terre, St. Kitts or St. Christopher Island.	Apr., 1884.	Cardiff..... Patent fuel Blacksmith.....	Less than 100 tons do do		\$9.00 Lighterage and stowing \$1.25 per ton.	By lighters; in hogsheads.
Anguilla, W. I.	Sept., 1883.	None	None ...	None ...		
St. Martin, W. I.						
Caracas, St. Bartholomew, W. I.						
St. Eustatius, W. I.						
Nevis, W. I.	Sept., 1883.	None	None ...	None ...		
Antigua, W. I.	Sept., 1883.	English (soft).	10	100	\$9.60, delivered and stowed.	By lighters; moderately rapid; rarely interrupted.
Montserrat, W. I.		None	None ...	None ...		
Point à Pitre,* Guadeloupe, W. I.	Mar., 1884.	None	None ...	None ...		
Portsmouth, Dominica, W. I.		None	None ...	None ...		
Roseau, Dominica, W. I.		None	None ...	None ...		
Fort de France, Martinique, W. I.	Jan., 1887.	Welsh	Large quantity.	Large quantity.	\$9; \$5 to men-of-war; 15 cents per ton for delivery.	Alongside wharf; rapid.

* Coal is imported for French war vessels; none for sale.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
			St. Thomas	None	None.
None		None	St. Thomas		None.
None		None	Antigua ..	None	None.
At English harbor; 400 tons patent fuel.	1½ miles.....	None	St. Thomas	None	For small repairs.
None		None	Antigua ..	None	None.
French; 300 tons on hand.	100 rods.....	None	Fert de France, Martinique.	None	Several.
None		None	do		None.
None		None	do	None	None.
French; 400 tons patent fuel.	Piled on the wharf; electric light at night.	None	St. Lucia..	One; 416 extreme length by 110 on top by 27.8 draught. Charges 50 cents ton for admission, 22 for decking, and 10 for each day after first.	Light repairs.

32 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Port Castries, St. Lucia, W. I.	Feb., 1888.	Welsh	4,000 to 5,000.	4,500	\$6.50 f. o. b....	20 to 21 feet of water alongside wharf; further dredging to 28 feet in progress; rapid; with baskets; no interruption.
Bridgetown, Barbadoes, W. I.	Feb., 1888.	do	Large...	Large...	\$9; 37 cents lighterage,* \$8.50 at wharf	By lighters; rapid; no interruption; 13 feet water at wharf.
St. Vincent, W. I.	Mar., 1884.	None .....	.....	.....	.....	.....
Santa Ana, Curaçao, † W. I.	Feb., 1887.	Welsh	300	350	\$10, alongside	By lighters; as fast as required; at all seasons; coal pier in course of construction.
Port Spain, island of Trinidad.	Feb., 1887.	Cardiff	2,000	2,000	\$11	By lighters, from barge moored in 16 ft. water.
Matamoros, Mexico.	Sept., 1883.	None	None	None .....	.....	.....
Tuspan, Mexico.	.....	.....	.....	.....	.....	.....
Vera Cruz, Mexico.	Mar., 1884.	Anthracite ... Bituminous ... Patent fuel ...	Large ... 44,000 30,000	Large ... 120,000	\$10 to \$13 ... \$1.90 per ton for delivering and stowing.	By lighters; medium rate. Liable to interruption in bad weather.
Tampico, Mexico. ‡	Sept., 1883.	Anthracite, English.	Small ...	Small ...	\$16 to \$20 .....	.....
Belize, British Honduras. §	Dec., 1883.	Welsh (occasionally).	.....	25	\$10 per ton. Lighterage extra.	By lighters
Livingston, Gulf of Honduras, Guatemala, C. A.	Apr., 1885.	None	None	None .....	.....	.....
Truxillo, Honduras, C. A.	.....	.....	.....	.....	.....	.....

* Could be purchased cheaper by contract.

† Excellent harbor; coal for Dutch navy,

§ Sailing vessels come in with coal and remain until unloaded.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	30 to 40 yards..	None	Barbadoes	None	None.
British; quantity unknown.	$\frac{1}{2}$ mile.....	None	St. Lucia..	None	Good.
.....	.....	None	St. Lucia..	None	None.
All coal is kept for Dutchmen of war, but others are supplied.	$\frac{1}{2}$ mile	None	St. Thomas	None	None.
British, 400 tons.	.....	.....	.....	None	Small.
None .....	.....	None	Galveston, Vera Cruz.	None	None.
.....					
None	$\frac{1}{2}$ m. to anchorage in harbor; $3\frac{1}{2}$ miles to anchorage off Island of Sacrificios.	Coal veins 100 miles inland, worked in a very primitive way.	In the U. S.	None	Shops belonging to R. R. Co. will make repairs.
.....	.....	.....	Vera Cruz.	None	One small railroad shop.
.....	.....	.....	.....	None .....	.....
None .....	.....	.....	.....	None	None.
.....					

but others can get it. ; Small quantity for use of Mexican Central Railroad.

34 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Puerto Cortez, Honduras, C. A.	-----	-----	-----	-----	-----	-----
Puerto Cabello, Honduras, C. A.	Aug., 1883.	None (ss a role).	None (disposable).	Small, for private use.	\$10 (not less)	Easy, but slow
Pearl Lagoon (Mosquito coast), Central America.	Jan., 1883.	None	None	None	-----	-----
Great Corn Island (Mosquito coast), Central America.	Jan., 1883.	None	-----	-----	-----	-----
Bloefields, Nicaragua, C. A.	Aug., 1884.	None	None	None	-----	-----
San Juan del Norte (Grey Town), Nicaragua, C. A.	Aug., 1884.	None	None	None	-----	-----
Port Limon, Costa Rica.	July, 1883.	Pittsburgh	200 (890 expected for railroad).	100 tons per month received.	\$15 at pile	-----
Boca del Toro (Chiriqui Lagoon), United States of Colombia.	Mar., 1883.	None	None	None	\$4.50, mined by native labor.	By mining
Shepherd's Harbor (Chiriqui Lagoon), United States of Colombia.	Mar., 1883.	None	None	None	-----	do
Colon, *United States of Colombia.	Mar., 1883.	Welsh American.	5 or 6 cargoes.	5 cargoes	\$15 to 20, at accommodation of R. R. Co. At times from coal vessel for \$10. Lighterage and stowage \$2.	Alongside wharf or by lighters; difficult in season of fresh trades.
Puerto Bello, United States of Colombia.	-----	-----	-----	-----	-----	-----
Cartagena, United States of Colombia.	Jan., 1885.	-----	35 in hands of Government.	-----	\$25	-----

* The 5 or 6 cargoes belong to railroad company.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal min- ing in vicinity.	Next near- est coal- ing port.	Number and size of dry- docks.	Machine shops at which steamers can repair.
None	Alongside wharf.	None	Curacao .. St. Thomas	None	One large shop, ca- pable of all kinds of repairs.
.....				None	
.....				None.	
None		None	Colon.....	None	None.
None		None	Colon.....	None	None.
None		None	Colon.....	None	Good shops owned by railroad com- pany.
None		Deposite not worked.	Colon.....	None	Small forge at rail road shops.
.....		Deposits on hay shore not worked.	Colon.....	None	None.
None	In care to wharf, then to steamer.	None		None	Railroad shops.
.....					
.....		None. Veins found at San An- dres, 25 miles in- land.	Colon.....	None	None.

36 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tone of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Barranquilla, United States of Colombia.	Sept., 1883.	Cardiff..... Patent fuel...	Small (for use of rail-road).	200	\$10 (no fixed rates for delivery).	By lighters; slow. From December to April is the windy season.
Sabanilla, United States of Colombia.	July, 1885.	None. Can get by rail from Barranquilla.	.....	.....	\$13 per ton for patent fuel.	By lighters.....
Santa Marta, United States of Colombia.	Mar., 1884.	None.....	None...	None...	.....	.....
Rio Hacha, United States of Colombia.	Sept., 1883.	Cardiff.....	Small...	100	\$10	By lighters; slow. From December to April is the windy season.
Maracaibo or Coro, Venezuela.*	.....	None.....	None...	150 to 200 tone English.	\$13 to \$15.....	By lighters; no interruption.
Cumana, Venezuela.	.....	.....	.....	.....	.....	.....
Rio Caribe, Venezuela.	Aug., 1884.	None.....	.....	.....	.....	.....
Ciudad Bolivar (Angostura), Venezuela.	.....	.....	.....	.....	.....	.....
Campano, Venezuela.	Aug., 1884.	Brought from Island of Trinidad.	.....	Occasionally a small amount on hand.	.....	No facilities.....
Puerto Cabello, Venezuela.	Dec., 1885.	Cumberland..	450	Supply uncertain.	.....	Poor facilities.....
Barceloa, Venezuela.	.....	.....	.....	.....	.....	.....
Mochima, Venezuela.†	Aug., 1884.	None.....	.....	.....	.....	.....

* The tug employed at the bar keep coal at Fort St. Carlos and at Maracaibo.
† 30 miles east of Barcelona.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	5 miles.....	None (coal inland not worked).	Colon.....	None	None.
None .....	.....	None	Colon.....	None	None.
None .....	.....	None	Colon.....	None	None.
None .....	.....	None	Colon.....	None	None.
None	½ mile. Steamers might lie opposite.	None. At Isle Thois is coal injurious to boilers. Large deposits at the Rio Limon.	Curacao; St. Thomas	None	None.
None .....	.....	None .....	.....	None	None.
None .....	.....	None	Island of Trinidad.	None	None.
None .....	.....	None nearer than 30 to 75 miles.	.....	None	None.

38 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following North Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tone of each at date.	Average tone on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
LaGuayra, Venezuela.	Dec., 1885.	Cardiff.....	Small...	Supply not to be relied upon.	.....	By lighters.....
Paramaribo, Dutch Guiana, South America.	Aug., 1884.	Cardiff.....	Sufficient for use of Government steamers and the regular line to Amsterdam.		\$10 to \$12; delivery and stowing, \$1 per ton.	Merchant steamers coal from wharf; gunboats from lighters; exceedingly slow; not interrupted.
Demerara (Georgetown), British Guiana, South America.	Sept., 1884.	Welsh Patent fuel....	6,000 3,000	10,000	\$7.50 to \$10, in the bunkers.	From punts in baskets, alongside wharf or from bulk direct; satisfactory; no interruption.
Cayenne, French Guiana, South America.	.....	.....	.....	.....	.....	.....

Exhibit of coal to be had at the following South Atlantic

Para, Brazil....	Oct., 1885.	Welsh } Scotch }	5,000	5,000	\$12 on board }	By lighters and small baskets; slow. Very little interruption.
Maranhao, Brazil.....	.....	Welsh	1,500 to 2,000.	1,700	\$12.....	By 50-ton lighters; slow.
Ceara, Brazil .....	.....	...do	200 to 250	225	\$11.05 to \$13.66; exchange 21 to 21½; \$1.06 for delivery per ton.	In sacks on jangades of 1½ to 2 tons; slow.
Natal, Brazil.....	.....	.....	.....	.....	.....	.....
Parahiba, Brazil.....	.....	.....	None ..	None ..	.....	.....
Navao, Brazil .....	.....	Cardiff.....	200	200	\$15.....	By lighters; slow
Pernambuco, Brazil.	Oct., 1887.	...do	6,000	6,000	\$8.00 stowed; inside break-water.	By lighters; 200 tons per day.
Maceio, Brazil.....	.....	.....	.....	.....	.....	.....

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None .....	.....	None; deposit, but not worked.	Curaçao ..	None	None.
None	100 yards from pile to lighter.	None	Demerara, Cayenne.	None	One Government machine shop for steamer work.
None	50 yards.....	None	Paramaribo, Saint Lucia.	One dry-dock, granite. iron gates, 230 feet by 45 feet by 11 feet. For cleaning alone, admits vessels 250 feet long.	Two first-class; best machinery and workmen.
.....					

Station ports, together with the usual supply on hand, cost, etc.

None	$\frac{1}{2}$ mile.....	None	Maranhao.	None	Extensive and excellent.
None. Coal by contract.	1 mile	None	Para.....	None	Two foundries with limited means.
None	$\frac{1}{2}$ mile if inside reef, if outside, 1 mile.	None	Maranhao, Pernambuco.	None	Railroad shops.
.....					
None .....	.....	None	Pernambuco.	None	None.
None	400 yards	None	do	None	Railroad shops.
None	1 mile	None	Bahia.....	None	Good for ordinary repairs.
.....					

40 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following South Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Aracaju, Brazil.	.....	.....	None	None .....	.....	.....
Bahia, Brazil...	July, 1886.	Cardiff..... } English..... }	.....	8,000 {	\$9 stowed (from vessel).*	Slow. From April to August liable to southerly galea.
Rio de Janeiro, Brazil.	Oct., 1886.	Cardiff..... } Scotch..... } English..... }	30,000	22,000	\$7.98†..... }	By lighters; rapid. Seldom interrupted.
Santos, Brazil..	Nov., 1886.	Cardiff..... } Newcastle.. }	1,000	1,000	\$7.92.....	By lighters, or by bringing coal hulk alongside.
Desterro (St. Catherine Island), Brazil.†	July, 1885.	Cardiff.....	600 to 800	500 to 600. Yearly consumption 3,000.	\$16.80 to \$18.90 delivered on board foreign vessels.	By 20 to 30 tons lighters; baskets; rapid. Slow at Santa Cruz. High winds in July, August, and September. No means of towing lighters to ships at under anchorage.
Rio Grande do Sul (São Pedro), Brazil.	.....	.....	.....	.....	.....	.....
Montevideo, Uruguay.	Dec., 1886.	Welsh..... } Newcastle.... } Scotch..... }	14,000 } 500 } 1,000 }	20,000	\$9.73† {	By lighters. Rapid. Weather may interrupt in June, July, and August.
Colonis, Uruguay.	May, 1885.	None	None	None .....	.....	.....
Payeandu, Uruguay.	Oct., 1887.	Cardiff.....	300	50 to 200	.....	By lighters. 50 tons a day. No interruption.
Maldonado, Uruguay.	Dec., 1886.	None .....	.....	.....	.....	.....
Buenos Ayree, Argentine Republic.	Nov., 1883.	Cardiff..... } Scotch..... }	.....	2,500 {	\$9.60..... Delivery and stowing, \$1.44 per ton.	By lighters from the collieries. Slow. Always liable to interruption.
Rosario, Argentine Republic.	Oct., 1887.	Cardiff.....	.....	1,200	\$16 f. o. b.....	By lighters, or by going alongside hulk.

* German government contract (1887) for Welsh, \$9.84 alongside, \$9.96 stowed.

† German government contract (November, 1887) for Welsh, \$8.64 alongside, \$8.77 stowed.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None .....	.....	None	Bahia	None	None.
German contract.	1 to 3 miles ...	None	Rio, Pernambuco.	None	Yes. At Monteerrat partial repairs, but very expensive.
None	3 miles.....	None	Bahia.....	Four dry-docks, 2 Government and 2 private; 488 by 70 by 25 private; 420 by 60 Government; 240 by 35 Government.	Several.
None .....	.....	None	Rio de Janeiro.	None	None.
None	$\frac{3}{4}$ mile; at Santa Cruz 10 miles.	To be worked. A railroad runs to coal-field from the harbor of Imbituba. Good coal.	Santos, Rio de Janeiro, Montevideo	None	None.
None	1 mile	None	Rio de Janeiro.	Two dry-docks: 420 by 55 by 18. 276 by 51 by 14.	Several; very good.
None .....	.....	None	Buenos Ayres.	None	None.
.....	.....	.....	.....	None	None.
None	5 miles.....	None	Montevideo.	None. Only one in Republic at San Fernando. 300 by 64 by 13.	Several; tolerably good work, but expensive. §
None	200 yards from bulk.	None	Buenos Ayres.	None	None.

† Coal belongs to one English and one Brazilian coasting steam companies; not for sale.
§ The dredging has deepened the river for vessels of 18 feet.

Exhibit of coal to be had at the following South Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Bshia Blanca, Argentine Republic.	Apr., 1884.	English.....	Large.....		\$14.00	
Santa Cruz, Patagonia.	Dec., 1882.		None.....			
Port Stanley, Falkland Islands.	Jan., 1887.	Cardiff.....	3,500 (in hulk).	500	\$12.15	Alongside hulk. Slow. Winds in summer, snow-squalls in winter, interrupt.
Ascension Island.	1884.	Welsh..... Danish..... Patent fuel...	Large.....			By lighters. Rapid.
Jamestown, St. Helena.	June, 1885.	Welsh..... English..... Of very bad quality.	250 250	500 to 1,000	\$24.00 Stowing, \$1 per day.	By lighters; 100 tons daily. Rapid if sea is smooth.
St. Paul de Loando, West Africa.	May, 1885.	Cardiff.....	Large quantity...		\$19.00 on board ship.	By lighters and baskets. Rapid. Much better place to coal than the Congo.
Cape Town, South Africa.	July, 1887.	Cardiff.....	45,000	50,000	\$11.00 at wharf, if alongside wharf. If in stream, \$1 per ton extra.	At wharf, or by 200-ton lighters, and sacks. Rapid. Seldom interrupted.
Simon's Town, South Africa.	.....	Cardiff, Newcastle.	1,000 in private hands.	1,500 to 2,000.	\$14.40, delivered alongside in bags.	By 7 to 9 ton lighters; 100 to 150 tons daily; seldom interrupted.
Mossel Bay, South Africa.	.....	English.....	100	100	\$14.40 to \$15.60, 2,000 pounds, delivery, \$1.68 per ton.	By lighters.....
Port Elizabeth, South Africa.	July, 1887.	Welsh.....	Large quantity.		\$12.15 delivered alongside.	By bags; rapid; interruption liable during southeast monsoon season, from September to December; lighters hold 50 to 60 tons.
East London, South Africa.						

* No market. Only for use of Southern Railroad Company. † At Beane

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
				None	None.*
			Straits of Magellan.		
None	$\frac{1}{2}$ mile	None	Montevideo.	None	None.
British		None	St. Helena.		
British, 1,000 tons.	200 yards, from coal yard to jetty.	None	Ascension Island.	None	None.
Portuguese; always short.	1,000 to 2,000 yards. Vessels can anchor within 200 yards.	None. Good deposit.	Banana Creek.	None	One large shop. Mechanics poor and lazy.
British, at Simon's Town.	At wharf; if in stream, $\frac{1}{2}$ mile.	None	Simon's Town.	One dry-dock, 500 by 68 by 26; 1 patent slip for vessels of 1,200 tons. Charges 60 cents a day per gross register ton.	Several. Government and mail-steamers shops.
British; 10,000 tons; $\frac{1}{2}$ is Newcastle.	350 to 400 yards.	None	Table Bay.	One patent slip for vessels of 1,200 tons register.	British Government naval station.
None			Cape Town, Port Elizabeth.	None	None.
None	$\frac{1}{2}$ mile	None	Cape Town.	None	Good for ordinary work.

Creek, \$19 per ton, stowed in bunkers by French and Dutch house.

44 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following South Atlantic Station

Names of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Durban (Port Natal), South Africa.	July, 1887.	Welsh	Large quantity.		\$17 of 20 cwt. delivered alongside at outer anchorage.	By lighters; depends on water on bar, and weather.
Mozambique, South Africa.	Mar., 1886.	Cardiff	1,500	1,500	\$15; 10 cts. per ton for stowing.	By lighters; slow; no interruption.
Johnna Island, Comoro Group.	Mar., 1887.	None	None ..	None ..		.....
Mayotta, Comoro Group.	Sept., 1885.	Patent fuel ...	500	500	\$11.97 to French ships; 20 per cent. additional to others.	By lighters
Zanzibar, South Africa.	Mar., 1887.	Cardiff	3,000	3,000	\$11.13 delivered.*	By small lighters; slow; no interruption.
Tulleur, Madagascar.	Feb., 1884.	None	None ..	None ..		.....
Mourandara, Madagascar.	Feb., 1884.	None	None ..	None ..		.....
Mojunga, Madagascar.	Mar., 1887.	None	None ..			.....
Hellville, Nosai Bé, Madagascar.	Apr., 1886.	Patent fuel † ..	2,000	2,000	\$11.85	By lighters; slow; no interruption.
Sainte Marie de Madagascar.	Apr., 1887.	Patent fuel † ..	6,000	6,000	\$14.86	By lighters; slow
Fénérive, Madagascar.	1884.	None	None ..			.....
Tamatave, Madagascar.	Apr., 1887.	Patent fuel † ..	Large quantity.		\$10 .....	.....
Mahé, Seychelles Islands.	Oct., 1883.	Cardiff	1,300	1,000	\$14	By lighters; slow; no interruption.

* German government contract for Welsh, three years from April, 1883, is \$10.10 alongside, and \$10.35 in bunkers; 50-ton lighters to be provided; 300 tons in 24 hours.

† Belongs to French government.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal min- ing in vicinity.	Next near- est coal- ing port.	Number and size of dry- docks.	Machine shops at which steamers can repair.
None	Coal in hulks and stores, 3 miles.	Coal de- posits 200 miles in- land.	Port Eliz- abeth.	None	Two. Good for or- dinary work.
None	$\frac{1}{4}$ mile	Coal seams 14 meters thick; semi-bi- tuminous.	Zanzibar.	None	None.
None .....	.....	.....	Zanzibar, Seychelles.	None	None.
French	$\frac{1}{4}$ mile	None	Zanzibar, Mozam- bique.	None	None.
British; 3,000 tone patent fuel.	$\frac{1}{8}$ mile	None	Mozam- bique, Aden.	None	None.
None .....	.....	None	Mozam- bique.	None	None.
None .....	.....	None	Mozam- bique.	None	None.
None .....	.....	None	Mozam- bique.	None; but fine beach and large rise and fall of tide.	None.
French; another at Diego Saa- rez.	$\frac{1}{4}$ to $\frac{1}{2}$ mile	Yes	Seychelles, Mauritius, Zanzibar.	None	None.
French at Diego Saa- rez.	.....	.....	.....	None	None.
None .....	.....	None	Bourbon.	None	None.
French .....	.....	.....	.....	None .....	.....
French	100 yards	None	Bourbon, Mauritius, Aden, Zan- zibar.	None	None.

46 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following South Atlantic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
St. Denis, Ré-Union Island.						
Port Louis, Mauritius.	May, 1887.	Cardiff.....	4,000	6,000	\$10.58.....	By lighters; slow; liable to interruption from December to May.
Diego Garcia, Chagos Archipelago.	Aug., 1887.	Cardiff.....	2,500	2,500	\$10.04; 11.67 f.o. b.	Orient Steamship Line keep nine 75-ton lighters always loaded; 12 tons an hour.

Exhibit of coal to be had at the following Pacific Station

Cape Lisburne, Alaska.	May, 1885.	Native lignite. Good.				Coal veins easily mined by boat's crews.
Port Clarence, Alaska.	May, 1885.	Bituminous...	600	600		
Onnalaska, Alaska.*	May, 1885.	Bituminous...	500	500	\$15 to \$20.....	By bags or baskets from boats; slow.
Sitka, Alaska.	Sept., 1885.	Wellington, Nanaimo.	Sufficient to meet the demand.		\$11.75.....	
Departure Bay, Vancouver Island.	May, 1885.	Native bituminous. "Wellington" is the best.	2,000		\$4 at mines; 10 cents for stowing.	Alongside wharves; from chutes; rapid.
Nanaimo, Vancouver Island.	May, 1885.	Native bituminous.	2,000		\$3.75 at mines; 10 cents for stowing.	
Victoria, Vancouver.	May, 1885.	Nanaimo.....	2,000	2,000	\$7; stowing 10 cents extra; \$3 to \$4 at mines.	From coal yards with wheelbarrows; rapid; no interruption.
Esquimaux, Vancouver Island.	Aug., 1886.	Nanaimo.....	2,000	2,000		
Port Townsend, Wash.	Feb., 1887.					

* The Alaska Commercial Company keeps a supply at Kadiak for the use of their own steamers. It was had for \$10 a ton.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	$\frac{1}{4}$ to $\frac{1}{2}$ mile	None	Seychelles.	Vessels of 750 tons said to have been docked at St. Pierre. Three dry-docks; 320 by 45 by 15, 353 by 60 by 18, 325 by 60 by 21; two small ships.	Several; 25-ton derrick.
.....	.....	.....	.....	None	None.

ports, together with the usual supply on hand, cost, etc.

U. S. at Ounalaska; 500 tons for revenue steamers.	.....	Has been abandoned.	Port Clarence.	None	None.
U. S. at Ounalaska.	.....	None	Ounalaska	None	None.
U. S. British at Victoria.	.....	None	Victoria ..	None	None.
.....do	None	None	Departure Bay.	None	None.
.....do .....	.....	Extensive; 1,000 tons a day.	Nanaimo ..	None	None.
.....do .....	.....	500 tons a day.	Victoria ..	None	None.
British	Alongside wharves.	Extensive.	Esquimault	None	Several.
.....do .....	.....	.....do	Victoria ..	One; take vessel 450 by 65 by 26 $\frac{1}{2}$.	
British, Vancouver.	.....	.....do	Esquimault	None	One; quite small.

† Prospecting on Admiralty Island; coal believed to be plentiful.

Exhibit of coal to be had at the following Pacific Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Seattle, Wash.	Feb., 1887.	Native bituminous.	2,000	.....	\$3 at mines; 10 cents for stowing.	Alongside wharf; chutes; rapid.
Tacoma, Wash.	Feb., 1887.	...do.....	2,000	.....	\$3.25 at mines; 10 cents for stowing.	...do.....
Olympia, Wash.	Feb., 1887.	.....	.....	.....	.....	.....
Portland, Oregon.	Sept., 1884.	Native bituminous.	Ample supply	.....	\$3.....	.....
Coos Bay, Oregon.	May, 1885.	...do.....	...do.....	.....	\$3 delivered; 10 cents for stowing.	Alongside wharf; rapid; 2 wharves at Empire City and 1 at Marshfield.
San Francisco, Cal.*	Mar., 1888.	Seattle..... Australian..... West Hartley..... Cardiff..... Anthracite..... Cumberland.....	...do..... ...do..... ...do..... ...do..... ...do..... ...do.....	..... ..... ..... ..... ..... .....	\$10.00 10.00 11.00 10.50 15.00 12.50 for cargoes to arrive; spot rates, \$2 more.	Men-of-war usually coal at anchorage in bay, $\frac{1}{2}$ to $\frac{1}{4}$ mile, by large lighters and baskets; only liable to temporary interruption from heavy winds. At Mare Island navy-yard, coal at wharf; by wheelbarrows.
San Pedro, Cal.	May, 1885.	Anthracite	.....	.....	Very high	By lighters
San Diego, Cal.	Sept., 1884.	Seattle..... Australian..... English..... Vancouver's.....	} As at San Francisco. {		\$7.50 7.50 7.50 8.00	.....
Pichilique Bay, Lower California.†	July, 1886.	Anthracite ... Nansimo	1,700 350	1,000	\$9.00 Stowing and delivery, \$1.	By lighters hired at La Paz at \$10 to \$15 a day; no interruption; 45 tons per day.

* The importation of English coal is regulated by the grain crop.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
British, Vancouver.	Nil	Extensive; 1,500 tons a day.	Tacoma...	None	A good one.
....do	Nil	Extensive.	Seattle...	None	A good one.
			Tacoma...	None	None.
None		Coos Bay.	Coos Bay, or Vancouver.	One at Albina opposite, 400 by 72 by 18-28.	
U. S. at San Francisco.		3,000 tons a month.	San Francisco.	None	None.
U. S. Government coal at Mare Island navy-yard; 448 tons; anthracite.	$\frac{1}{2}$ to $\frac{1}{4}$ mile from wharfs to anchorage.	None	Mare Island.	Two wooden floating docks 108 by 40 by 9, 210 by 60 by 15; 1 stone dry-dock, at Hunter's Point, will take vessel 438 by 90 by 24. Hydraulic dock, Union Works, 450 by 66 by —.	Extensive and numerous. Union Iron Works, Riedel Iron Works; 58 foundries and machine shops.
	Alongside coal wharf; 10 to 15 yards.			Dock will take vessel 460 by 79 by 27 $\frac{1}{2}$; 1 wooden sectional for vessels 347 by 92 by 16.	At navy-yard, Mare Island. Large machine shop for all kinds of repairs.
U. S., at San Francisco.		None	San Diego.	None	
None		None	San Pedro.	Marine railway; will take vessel of 2,500 tons.	
U. S.; Mexican.	300 feet	On Yaqui River; not worked.	Mazatlan, Guaymas.	None	None.

† 150 tons opposite La Paz, owned by Mexican Government. No coal at La Paz, Cape St. Lucas, and San José.

Exhibit of coal to be had at the following Pacific Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Guaymas, Mexico	Apr., 1887.	Australian (poor).	1,000	None ...	\$11.61 Stowing and delivery \$1.	By lighters; moderate; no interruption.
Altata, Mexico.	Nov., 1883.	None	None ..	.....	.....	.....
Mazatlan, Mexico.	Mar., 1887.	Australian ...	1,000	1,000	\$11.90 at pile..	Bagged and brought off in lighters under tow of tug; rapid; liable to interruption in summer months by storms.
San Blas, Mexico.	Sept., 1883.	None	None ..	None ..	.....	.....
Acapulco, Mexico.	Mar., 1887.	Cardiff..... Cumberland ..	1,000 1,000	3,000 to 4,000.	\$13 Stowing and delivering \$1.	Bagged and brought off in lighters towed by ship's boats; rapid; 175 tons per day; no interruption.
San José de Guatemala	Apr., 1887.	None	None ..	None ..	.....	Weather uncertain from July to October.
Acajutla, San Salvador, C. A.	Jan., 1886.	None .....	.....	.....	.....	.....
* La Libertad, San Salvador, C. A.	Jan., 1886.	None	None ..	None ..	.....	.....
Amapala, Honduras, C. A.	Sept., 1883.	None	None ..	None ..	.....	.....
Corinto, Nicaragua	Dec., 1887.	Cardiff.....	300	650	\$14; price variable.	By lighters; rapid; no interruption; telegram will secure expedition.
San Juan del Sur, Nicaragua.	.....	.....	.....	.....	.....	.....
Punta Arenas, Costa Rica.	Sept., 1883.	.....	4 to 6	500 belonging to Costa Rican Gov't.	.....	Rapid; no interruption..

* No coal at La Union.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coal-ing port.	Number and size of dry-docks.	Machinery shops at which steamers can repair.
None	2 miles for draught of 20 feet.	None; anthracite abundant on Yaqui River, 120 miles.	Mazatlan.	None	None.
None .....	.....	None	Mazatlan, Pichilique.	None	Railroad shops at Culiacan.
Mexican Government has on hand about 600 tons.	1½ miles	None	Acapulco, Guaymas.	One dry-dock (building).	Two large shops.
None .....	.....	None	Mazatlan.	None	None.
Mexican Government has 800 tons.	300 yards	None	Mazatlan.	None; marine railway under construction by Mexican Government.	Pacific Mail Steamship Company's small shops; Government building shops not finished.
None .....	.....	None	Acapulco.	None	None.
.....					
None .....	.....	None	Panama.	None	None.
None .....	.....	None	Panama.	None	None.
None	50 yards; coal exposed to weather.	None	Panama.	None	None. Light repairs at Amelia, 7 miles distant.
.....					
Costa Rican station at San Lucas.	¼ mile	None	Panama.	None	None.

52 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following Pacific Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Panama, United States of Colombia.	Feb., 1888.	Cardiff.....	2,000	2,000 to 5,000	\$17 delivered alongside.	By iron lighters, as rapid as can be stowed; liable to interruption.
Buenaventura, United States of Colombia.	Sept., 1884.	None	None .....	.....	.....	Never coal here
Gnayaquil, Ecuador, S. A.	Sept., 1888.	None	None	None .....	.....	.....
Payta, Peru*	Nov., 1885.	English	2,400	2,000	\$16.46	From hulk by 20-ton lighters; merchant steamers go alongside hulk.
Eten, Tumbes, Lobos de Afuera, Peru.	Sept., 1886.	None	None	None .....	.....	.....
Pacasmayo, Peru.	Oct., 1885.	None, plenty of wood.	.....	.....	Wood \$5 a ton.	Lighters
Salaverry, Peru	Sept., 1886.	None	None .....	.....	.....	.....
Chimbote, Peru†	.....	.....	.....	.....	.....	.....
Supé, Peru.....	Sept., 1886.	None	None .....	.....	.....	.....
Callao, Peru.....	Mar., 1884.	Cardiff.....	Large quantity.	Large ..	\$15 to \$16	By lighters with buckets; rapid, from 30 to 40-ton lighters; no interruption; Grace Bros.
Arica, Chili †...	1884.	Cbiliao .....	.....	.....	.....	.....
Iquique, Chili..	Jan., 1886.	Cumberland .. English..... Chilian	} Large supply.. {		\$10.95 7.78 7.18	By lighters and baskets; rapid; heavy surf liable to interrupt at any time of year.

* Coal station of P. S. N. Co.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
P. S. N. Co. has contract to keep certain supply on hand for British Govt	2½ miles for large draught vessels; coal stored at La Boca, mouth of Rio Grande.		Payta	None	Pacific Mail Steamship Company's.
None		None	Panama Payta.	None	None.
None		None	Payta	None	Two small shops.
None		None	Callao	None	None.
			Callao	None	None.
None		Coal beds 125 miles interior.	Payta	None	None.
None		Coal fields inland not worked.	Callao	None	None.
	Less than ½ mile from coal hulk to anchorage.	None	Payta	One floating dock 300 by 76 by 29; capacity 5,000 tons; up to 21 feet draught.	Yes.
			Iquique		
None	Warehouses close to beach; coal easily shipped at the mole.	In south Chili.	Caldera	None	Two; ordinary repairs.

† Railroad company has deposit for locomotives.

54 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following Pacific Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Caldera, Chili.	Mar., 1887.	English..... Chilian	800 1,000	1,000 14,000	\$5.70 \$5.00 to \$5.25 50 cents lighterage.	By lighters; rapid; no interruption.
Carrizal Bajo, Chili.*	Dec., 1886.	Australian....	500	Uncertain.	\$7.00	-----
Coquimbo, Chili.	Mar., 1887.	Welsh..... Australian.... Chilian	2,000 1,000	2,000 1,000	\$12.15 9.17	By lighters, 70 to 100 per day; no interruption.
Valparaiso, Chili.	Mar., 1884.	Chilian..... English..... Australian.... Welsh.....	2,000 is the capacity of hulks.	2,000 { (less) }	\$6.00 \$8.00 to \$15.00	By lighters; moderate; a norther would interfere.
Talcahuano, Chili.	Mar., 1887.	Chilian.....	-----	-----	\$6.10	By lighters or from coal vessel; from June to August liable to interruption from winds.
Lota, Chili.....	1883.	Chilian.....	200,000	-----	\$5.00	Small vessels at pier; by lighters and baskets; rapid, except with southwest winds.
Lebu, Chili....	1883.	Chilian.....	Mines ..	Mines ..	-----	Northerns interrupt....
Valdivia, Chili.	1883.	-----	-----	-----	-----	-----
Corral, Chili....	1883.	-----	Small, not to be depended on.	-----	-----	-----
Cobija, Chili....	-----	-----	-----	-----	-----	-----
Sandy Point, Chili.	Feb., 1887.	Welsh.....	1,800	1,800	\$15.80	Alongside hulk; rapid.

* No coal at Huasco, Taltal, or Tocapilla.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coal-ing port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	$\frac{1}{4}$ mile.....	In south Chili.	Coquimbo.	None	One excellent shop
.....	.....	.....	.....	None	Railroad shops; ordinary repairs.
British	$\frac{1}{2}$ mile.....	In south Chili.	Valparaiso	None	Railroad company's
Chilian Government has Cardiff for its own use.	From bulk to anchorage.	At Lota, Coronel, and Lebu.	Coquimbo. Talcahuano.	Two floating docks; 302 by 60 by 40, draught 22; 265 by 50 by 30, draught 16; capacity 6,000 to 2,500.	Several; any kind of work can be done
None	1 mile.....	600,000 tons annually.	Lota	None	Railroad shops at Concepcion.
None	From mines by rail to pier, $\frac{1}{4}$ to $\frac{1}{2}$ mile; $\frac{1}{2}$ mile to ship.	Very extensive.	Talcahuano.	None	Boat repair shop iron shops for ordinary work on steamers.
.....	.....	Extensive.	Lota .....	.....	.....
.....	.....	.....	Corral .....	.....	Boiler-shops.
.....	.....	At Lota and Coronel.	Lota .....	.....	.....
.....	.....	.....	Lebu .....	.....	.....
None .....	.....	Several mines—not worked. Coal poor.	Port Stanley.	None	None.

56 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following Pacific Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Honolulu, Hawaiian Isl's.	Aug., 1887.	Nanaimo.... } Australian.... }	15,000	-----	\$12 gold, alongside.	At wharf or by lighter; inside bar, no interruption; outside southerly winds in November and December.
Hilo, H. I. {	Feb., 1883.	Anthracite ... } Bituminous... }	Small..	Small...	\$9.00	-----
Lahaina, H. I.	-----	None	-----	-----	-----	-----
Jaluit, Marshall Islands.	Oct., 1887.	Westphalian .. Australian	-----	-----	\$13.80 10.95 Alongside.*	-----
Jamestown (Santiago), Ponapi, Caroline Islands.	Nov., 1887.	-----	Small supply for Spanish ships.	-----	-----	-----
Papeete, Tahiti, Society Islands. †	May., 1886.	Australian.... Welsh	2,000 300	2,000	\$9 to \$12 \$14 on wharf; delivery 50 cts.; 10 cts. from vessel.	At pier or by lighters; 75 tons per day.
Apia, Samoa Islands.	June, 1886.	Westphalian ..	100	100	\$15 to \$20	By lighters.....
Pago-Pago, Samoa Islands. §	June, 1886.	Anthracite. ...	1,300	1,300	\$1.50 to get to ship.	By lighters
Levuka, Fiji Islands.	Aug., 1886.	English	100	Occasionally brought in English vessels as ballast.	\$9.60 f. o. b., when for sale.	By small boats; slow; no interruption.
Suva, Fiji Isl'de	Aug., 1886.	Australian....	-----	-----	\$10 (contract).	Alongside hulk; rapid; occasional cyclones from December to March.
Nei-Afu, Vava Isl'd, Tonga.	July, 1886.	None	-----	-----	-----	-----
Noumea, New Caledonia.	1884.	-----	-----	-----	-----	Cyclones in January and February.
Russell, New Zealand.	Nov., 1883.	New Zealand .. Australian	500	500	\$4.20 7.20 Delivery and stowing 18 to 24 cents.	By lighters; best facilities here in New Zealand; 100 tons per day; no interruption.

* German contract prices.

† Welsh in private hands; Australian all in Government hands; no coal at Rairoa Island.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
U. S. ; 1,263 anthracite.	100 feet to 100 yards.	None	San Francisco.	One marine railway for vessels of 1,400 tons ; 50 cents per ton first day ; 25 cents thereafter.	One.
			Honolulu	None	None.
			do		
			Jaluit	None	None.
French 2,000 tons Australian.	$\frac{1}{2}$ mile	None	Pago-Pago	None	None.
German , contract.			Fiji Isl's.	None	None.
U. S. ; 1,300 on hand.	300 to 400 yards	None	do	None	None.
None ; at Suva contractor has 100 tons for British vessels.	Can anchor 100 fathoms from pier.	None	Russell, New Zealand.	None	None.
			do		
None				None	None.
French Govt. depot.			Russell, New Zealand.		
None		Extensive ; quality good.	Whangarei	None	Several large works.

† German Government contract, 1887-'90 ; for Westphalian, \$12.75 ; Australian, \$11.

§ United States coal worthless from exposure.

Exhibit of coal to be had at the following Pacific Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Whangarei, New Zealand.	Nov., 1883.	New Zealand Australian....	500	500	\$4.20 7.20 Delivery and stowing, 18 to 24 cents.	By lighters; slow; no interruption.
Auckland, New Zealand.	Aug., 1886.	New Zealand Australian....	1,000 500	1,500	\$4.20 \$7.50 f.o.b.	By lighters; rapid; baskets of 150 lbs.; small vessels coal from chute; no interruption.
Wellington, New Zealand.	Nov., 1885.	New Zealand Australian.... Welsh.....	1,000 500	1,600	\$4.90 6.10 9.50 Delivery and stowing, 18 to 24 cents.	By lighters; subject to interruption.
Lyttleton, New Zealand.	Nov., 1883.	New Zealand Australian....	1,200 600	1,800	\$4.20 7.20 Delivery and stowing, 18 to 24 cts.	By lighters and baskets; not very rapid; no interruption.
Dunedin, New Zealand.	Nov., 1883.	New Zealand Australian....	1,250 650	1,900	\$4.20 7.20 Delivery and stowing, 18 to 24 cts.	By lighters and baskets; not very rapid; no interruption.
Brisbane, Queensland, Australia.	.....	Australian....	Demand equals supply.	Mined accord'g to demand.	\$3.12 Lighterage to the bay, \$1.32.	Less 16 feet draught, go up river to city, and coal from points owned by collieries; more than 16 feet, coal in bay.
Newcastle, New South Wales, Australia.	.....	Australian....	Very large number.	1,500,000 exported annually.	\$2.64; stowing, 25 cts.	By powerful hydraulic cranes, in any weather; coal brought to pier in cars of 10 tons each.
Sydney, New South Wales, Australia.	Dec., 1884.	Australian; "Bulli" considered the best.	Practically unlimited.		\$3.04, delivered on board.	By large steam colliers, with steam winches, in any weather.
Melbourne, Victoria, Australia.	Oct., 1885.	Australian....	12,500	10,000	\$5.28, on the pier; \$5.52, on board.	From hulks or steam colliers; rapid; no interruption.
Hobart Town (Australia), Tasmania.	Dec., 1884.	Australian....	500	1,000 to 1,500.	\$5.84	From hulk alongside; steam winches.
Lanncoston, Tasmania.	1886.	.....	.....	.....	.....	.....

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-dock.	Machine shops at which steamers can repair.
None .....	.....	Extensive; quality good.	Russell, New Zealand.	None	Several large work
French Govt. has 3,000 to 5,000 tons at New Caledonia.	.....	Extensive; 65 miles inland by rail; good quality.	Whangarei	One 300 by 46 by 13½; 1 building, 500 by 81 by 33.	Several large work
None .....	.....	Extensive; quality good.	Lyttleton	Slip that will take vessel of 2,000 tons.	Two foundries and machine shop; ordinary repairs
None .....	.....	Quite extensive and of good quality.	Wellington Dunedin.	One dry-dock, 450 by 62 by 22½.	Several large work
None .....	.....	Quite extensive and of good quality.	Lyttleton	One dry-dock, 320 by 45 by 18½, at Port Chalmers; 1 floating, 170 by 40.	Several large work One can build steamers complete
None .....	.....	Several mines capable of large expansion.	Newcastle	One dry-dock; draught of 15 feet at neap and 17 at spring tides; 315 by 60 by 18 (to be lengthened to 420).	Three.
.....	Railroad cars come alongside on wharf.	Extensive; 1,750,000 annually.	Sydney, Melbourne.	One patent slip for vessels of 1,500 tons register.	Several; large repairs usually done at Sydney.
None	½ mile	Extensive.	Newcastle	Several; largest has capacity of 5,000 tons; 409 by 66 by 19; 450 by 58 by 20½; 1 building, 600 by 84 by 30, to be finished Jan., 1889.	Several; 70-ton shears and a 7-ton hammer.
None	Coal bulks in vicinity of anchorage.	Limited...	Sydney	Two, Alfred graving, 450 by 80 entrance (55½ bottom), by 21½ low water; charges for vessels over 600 gross tons 14 to 6½ cents per ton; double rates for days of docking and undocking; floating dock, 154 by 37 by 11½; charges 18 cents per ton for days of docking and undocking, and 8 cts. for lay days.	Yes; and repairs.
None	Now 100 to 200 yards from water's edge.	Limited; poor quality; good, inland, too remote for working at present.	Melbourne.	Two hydraulic slips; 1 capable of taking 1,000 tons gross measurement.	For small repairs.
.....	.....	.....	.....	Floating-dock, 130 by 37.	.....

60 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

No. 1.—*Exhibit of coal to be had at the following Pacific Station*

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Adelaide, S. Australia.	Dec., 1883.	Australian ...	8,000	.....	\$7.68; at Semaphore anchorage, \$8.88.	From hulks; rapid; at Semaphore anchorage delay possible in winter months.
Albany, West Australia.	Oct., 1885.	Australian....	1,800	1,200	\$10.20; stowing, 60 c. per ton.	From hulks; rapid; no interruption.
Matari, Henderson Island (New Britain).	Jan., 1886.	Australian, Westphalian.	1,200	1,000	*\$14.58	By lighters; slow; 50 to 100 tons a day.

Exhibit of coal to be had at the following Asiatic Station

Petropanlow-ski, Russia.	May, 1885.	.....	Less than 1,000	.....	.....	.....
Vladivostok, Russia.	Aug., 1886.	Saghalin.....	Ample supply		\$10 Mex	By large lighters; very slow.
Hakodate, Japan.	.....	Welsh, Australian, Takasima.	.....	.....	\$15.00	By lighters; rapid
Yokohama, Japan.	1884.	Welsh, Takasima, patent fuel.	2,000 to 3,000.	2,500	.....	By lighters; rapid
Yokosuka, Yeddo Bay.	Dec., 1884.	None	None ...	None ...	.....	.....
Higo, Japan ..	Nov., 1883.	Anthracite ... Takasima..... Karatsu	450 2,000 750	} 2,500 {	\$12.50 6.00 5.75	By 15-ton lighters; rapid; typhoon interrupts in August, September, and October.
		Shimagawa ... Miike.....	450 800		\$5, delivered and stowed.	
Nagasaki, Japan.†	1886.	Takasima..... Welsh	5,000 Small...	5,000 Small.	\$5.00	By lighters; rapid

* German contract price, October, 1887: Westphalian, \$13.80; Australian, \$10.47; alongside.
† Dockyard is in course of construction in the bay of Hiroshima.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	In hulks	None	Melbourne.	Slip for vessels of 1,500; dry-dock building, 260 by — by 26.	Several, besides Governm't works.
British; proposed.	In hulks .....	.....	Adelaide.	None	None.
None	200 yards	None	Cooktown (poor).	None	None.

ports, together with the usual supply on hand, cost, etc.

Russian, at Vladivostok.	.....	Dui; Saghalin.	Hakodate.	None	None.
Russian .....	.....	Dui; Saghalin.	Hakodate.	Govt. hydraulic; 2 sections completed; when finished will take the Vladimir Monomach.	
.....	.....	.....	Yokohama.		
Japanese .....	.....	At Takasima.	Kobe	See Yokosuka. Construction of dock in contemplation (1888).	At Yokosuka; extensive.
.....	.....	.....	Yokohama.	Three; largest, 459½ by 94½ by 28½. Charges for 1,200 tons (gross), \$550 for 3 first days, and \$75 a day thereafter; above 1,200 tons, 45c. ton additional 3 first days, and 5c. afterward; between 300 and 1,200 tons, \$350 to \$525, and \$35 to \$75 after 30 days.	Excellent.
British; 1,000 tons Takasima.	¼ to ½ mile	None	Nagasaki, Yokohama.	One; also one at Osaka; 250 by 50 by 11. River bar shallow.	Large ship-building yards. Shops at Osaka.
Japanese .....	.....	Takasima.	Kobe, Shanghai, Sassebo.	One; 431 by 89 by 22 neap and 27 spring tides; 1 marine railway, 1,200 gross tons. Charges about same as at Yokosuka.	Excellent.

62 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following Asiatic Station

Namo of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Sasebo, Japan.	Dec., 1887.	Takasima Muke	Ample supply.....		\$2.20 to \$2.65 f. o. b.	.....
Tientsin, China	Oct., 1883.	Chiuese..... Japanese	1, 100 2, 938	} 2, 500 {	\$6.30 to \$7.56 \$6.30 to \$8.82, delivered. (Highest figure is retail price.)	From wharf near coal-yard; by baakets; no interruption.
Chemulpo, Corea	May, 1885.	.....	No regular supply.		.....	.....
New Chwang, China.	Jan., 1883.	Native, hard... Native, soft... Japanese Keelung	130 20 100 30	} 100 { Steamers coal at Chefoo.	\$6 to \$13; delivery, 50c.; stowing, 20c.	By lighters ill-fitted for the service; slow; liable to interruption from high winds in March, April, October, and November. Port closed from middle November to end March.
Chefoo, China..	Nov., 1883.	Cardiff..... to Australian..... Japanese	1, 000 to 1, 500	3, 000 to 4, 000	\$14. 00 12. 00 8. 00	By lighters; tolerably rapid; in winter winds interrupt.
Shanghai, China	Aug., 1885.	Anthracite... Cardiff..... Australian..... Japanese	Small... 1, 000 15, 000 30, 000	} 40, 000 {	\$12. 00 Mex. 9. 25 Mex. 9. 25 Mex. \$5. 00 to 5. 25 Subject to 25 p. ct. variation.	By lighters; rapid; no interruption.
Ichang, China..	.....	Chinese .....	.....	Very small.	Forming \$6. with expense of keeping added.	With coolies and baakets; very rapid; no interruption except from heavy rain.
Hankow, China.	Oct., 1883.	Anthracite, bituminous (none fit for at's use, no market).	Small...	Small...	\$6. 25 Less delivery, \$2. 75; at the ruines, \$1 to \$2.	With coolies and baakets; very rapid; no interruption except from heavy rain.
Kiu-Kiang, China.	.....	None	None ...	None...	.....	.....
Chin-Kiang, China.	Oct., 1883.	Bituminous... Anthracite....	10, 000 2, 000	} 3, 000 {	\$7. 00 8. 00 Delivery and stowing, 10c. p. ton.	By lighter; very rapid; N.E. gales in winter liable to interrupt.
Ningpo, China.	Sept., 1884.	Formosa..... Australian....	1, 100 500	} 1, 000 {	\$9. 50 11. 50 Delivered.	By sampans; 50 tons in bunkers in 3 hours; liable to interruption in August and September from typhoons.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
Japanese ...	.....	Muke....	Nagasaki..	None now; 2 large ones to be built.	Full dock yard equipment in 1891.
None	100 to 500 yards	Chinese Gov. mine 60 miles N. E. of Tientsin; 200 tons daily average.	Che'oo....	One dry-dock at Taku, mouth of Peiho River, 340 by 40 by 13.	All kinds at Government works at Taku.
Chinese, at Toosun-ko-oo; Japanese.	50 yards from anchorage of a gunboat.	To small extent.	Chcfoo....	None	None.
None	100 yds. from pile to lighter, thence $\frac{1}{2}$ to 3 miles.	None	Shanghai, Tientsin (in winter closed by ice).	None	None.
None	100 to 600 yds.	None	Nagasaki.	Five; 450 by 80 by 18 to 21; 300 by 45 by 14; 345 by 70 by 10; 380 by 70 by 16; 380 by 57 by 17; not suitable for armored ships. Charges \$250 to \$400 for 2 days; \$50 to \$85 a day thereafter.	Several large works.
None	Few rods	Limited to native use.	Shauze (88 miles).	None	None.
None	From a few rods to $\frac{1}{2}$ m.	At Yunnan, not extensive. Trip to mines and back 30 to 60 days.	Shanghai, Shauze.	None	None.
None .....	.....	On Poyang Lake, soft coal. Intermit- tently carried on.	Hankow..	None	None.
None	$\frac{1}{2}$ mile.....	None	Wnbu (100 miles up the river).	None	None.
None	$\frac{1}{2}$ mile.....	None (nearest at Hang- Chow).	Shanghai.	None	None.

64 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following Asiatic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Foochow, China.	Mar., 1885.	Australian.... Welsh..... Formosan.....	300 300 Variable.	500	\$13. 00 17. 00 8. 00 Stowing 10 cts.	By lighters; interrupted only in typhoon season; steam launch available; not a usual coaling port.
Amoy, China...	Oct., 1883.	Cardiff..... Australian.... Formosan.....	50 1, 200 300	1, 700	\$14. 00 10. 00 7. 00 Delivered.	By lighters; tolerably rapid; no interruption.
Swatow, China.	Oct., 1883.		Small			
Keelung, Tamsui,* Formosa.	Nov., 1883.	Formosan..... Levan Levan... Obt'd at Tamsui in lim'd quantities.	Unknown	3, 000	\$4, large; nut coal \$2.50 to \$3 at the mine.	By small boats; 5 to 15 tons; depends on weather.
Hong-Kong, China (Br.).	Nov., 1886.	Cardiff..... Australian.... Japanese..... Chinese..... English.....	37, 400 28, 400 34, 500 500 1, 900	100, 000	\$9. 28 6. 82 6. 48 8. 50 Delivery and stowing 35c. (Mex).	By lighters, 500 tons daily; rarely interrupted, and then by high winds.
Canton, China.	Apr., 1884.	Japanese..... Cardiff, (small)	Small	Small	\$7. 00 12. 00	
Hoikow, Hainan.						
Saigon, Cochin China.†	1886.					
Bangkok, Siam.	Feb., 1886.	Welsh..... Scotch.....	500 } 700 }	800	\$13. 50 off city; \$22 at outer anchorage.	At wharf or by lighters..
Manilla, Philippine Islands.	Feb., 1887.	Australian.... Cardiff.....	3, 000 } 2, 000 }	3, 000	\$7 f. o. b. 9 f. o. b.	Hurricanes from August to November.
Cavite, Manilla.	1887.					
Labuan Island, NW. coast of Borneo.	1884.	Native				At pier

* At Tamsui no regulars trade; coal must be contracted for in advance—a two weeks notice.

† Can be obtained.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
Chinese 3,000 to 4,000. Formosa coal in arsenal.	$\frac{1}{2}$ mile.....	Keelung, Formosa.	Amoy....	One dry-dock at Pagoda anchorage, 380 on blocks, by 50 feet entrance; water on sill, neap, 13; spring, 17 feet.	In connection with docks, and at imperial arsenal.
None	$\frac{1}{2}$ to 1 mile.....	None	Tamsui, Keelung.	One dry-dock 300 by 60 by 16; 2 small docks for coasters.	Ordinary repairs at dry-dock.
.....	.....	.....	Amoy, Hong-Kong	.....	.....
A. Govt. colliery 6 miles east of Keelung (collapsing).	Short.....	Carried on to extent of demand. 30,000 to 50,000 tons.	Foochow..	None.....	None.
British, large quantity.	$\frac{1}{2}$ to $\frac{1}{2}$ mile.....	None.....	Amoy, Foochow, Manila.	Eight; largest 534 by 86 by 29. Charges, from 300 to 1,100 tons (gross), \$200 to \$495 (Mex.); above 1,100 45 cts. ton for 3 days, and 7 cts. ton afterwards.	Ample—shears, etc.
Chinese Gov't. has small deposits for its own use.	.....	.....	Hong-Kong	Five dry-docks (not in repair), 550 by—.	Not in working order.
.....	.....	.....	Hong-Kong Singapore.	.....	.....
.....	.....	.....	Manilla, Bangkok.	Govt. floating, 320 by 75, 4,000 tons.	.....
Siamese, 500 tons.	In river a few feet; at outer anchorage 30 miles.	None	Singapore.	One; 380 by 65 by 12 to 13 on sill at spring tides.	Shop connected with dry-dock; light repairs.
Spanish, 6,000 to 7,000 tons.	1 mile.....	None; coal on island of Ceylon poor.	Hong-Kong	Slip building, 1,500 tons.	Govt. shop for small repairs.
.....	.....	.....	Manilla...	Slip, 270 by 36 by 26 high water.	Yes.
British, 2,000 to 3,000.	.....	On island.	Singapore.	.....	.....

66 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following Asiatic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Pulo Lant, Borneo.	Feb., 1887.	Poor quality..	Supply uncertain..			
Kotei, Borneo.	Feb., 1887.	do	do			
Ternate, Moluccas.	Feb., 1887.		Small supply kept at these ports by Netherlands India Steamship Company.		\$12.00	
Amboina, Moluccas.	Feb., 1887.				\$12.00	
Bima, Sumbawa Island.	Feb., 1887.				\$12.00	
Sourabaya, Java.	Aug., 1885.	Cardiff..... Australian.....	3,000	3,000	\$9 to \$11 \$5 to \$7	By lighters of 30 tons capacity.
Batavia, Java.	Feb., 1887.	Cardiff..... Newcastle..... Australian.....	Large supply		\$11.25 \$6.80 to \$8.40	Liable to interruption in wet season from November to March; rapid.
Singapore, Malacca.	Feb., 1887.	Cardiff..... Newcastle..... Australian..... Borneo..... Japanese.....	42,000 900 8,500 1,500	110,000	\$9.25 8.00 6.00 \$4 to \$6 (Mex.). At wharf; stowing 5 to 15 cents; lighterage 40 to 75 cts.	At wharf with baskets; by lighters in roads; rapid at wharf; moderately fast at anchorage; liable to interruption in bay.
Deli, Sumatra.	Mar., 1886.	None.....				
Penang, Malacca.	Jan., 1887.	Wolsh.....	4,000	4,000	\$10.50 (Mex.)..	By lighters and bags; liable to interruption.
Acheen, Sumatra.	Feb., 1886.		No regular supply.			
Padang, Sumatra.	Oct., 1883.	Cardiff..... Australian.....	700 2,000	3,000	No market price; delivery 48c.	At wharf, or by lighters; slow; liable to interruption from winds from Oct. to March.

German Government contract (October, 1887); for Wolsh, \$7.78 alongside; \$7.90 stowed; 36 cents extra in roads.

ports, together with the usual supply on hand, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
			Sourabays.	None	
			do	None	
			Sourabaya and Manila.		
			Sourabaya.		
			do		
Dutch			Batavia.	Two floating; largest 293 by 73 by —; one dry-dock for small craft.	One.
Dutch; on Onrust Island.	One hour's tow	None; on Borneo, poor.	Sourabaya, Singapore.	One government at Onrust, large enough for any vessel; two small private docks.	At Onrust; also two private shops.
British, on island Rulo Brane; 2,500 tons; German contract, at Singapore.	At wharf, 40 to 50 yards; in roads, more than a mile.	At Sadung, Borneo, or Bruni River, Labuan Island; good coal.	Penang, Batavia.	Five largest; 470 by 60 by 21.	Several; all repairs except castings; 40-ton shears.
None			Singapore.	None	None.
None	2 sheds on Penang Island, 2 miles from anchorage; 1 shed at dock, 4 miles.	None	do	One; 275 by 50 by 12 low water, at mouth of Prye River, opposite Penang Island.	Two; ordinary repairs; 20-ton shears.
Dutch; at Pulo Brasse.				None	Small.
Dutch; † English, 1,450; Borneo, 350.	If at wharf, 100 yards.	None; rich deposits.	Batavia...	None	None.

† Very little coal, and that for private use.

68 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following Asiatic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manuer of coaling, rapid or slow, etc.
Basscin, Burmah, India.	.....	Cardiff..... Newcastle..... Scotch..... Australian.....	600 1,700 2,300 1,660	5,000 to 6,000	\$9.20 to \$10.50 \$7.36 to \$8.28 On board. Stowing, 46 cents.	By lighters; fair; no interruption.
Rangoon, India.	Oct., 1883.	Cardiff..... English..... Scotch..... Australian.....	2,500	 3,000	\$8.20	Coolies with baskets; tolerably rapid; no interruption.
Moulmein, British Burmah.	Oct., 1883.	.....	Few	.....	.....	.....
Akyab, India.	Oct., 1883.	Scotch..... Welsh..... English.....	600 600	500	\$9.66 Stowing \$1.00	By lighters; slow; liable to interruption from Apr. to Oct.
Chittagong, India.*	Oct., 1883.	.....	.....	200 to 300	\$11.50 Delivery and stowing, 24 cents.	Slow; no interruption...
Calcutta, India.	Oct., 1883.	Native..... Welsh..... Australian.....	1,000 4,000 400	 25,000	\$3.60 to \$4.60 \$9.30 \$4.60 to \$5.50	By boats; rapid; liable to interruption in May and October.
Madras, India.	Nov., 1883.	Australian..... Welsh.....	370	 1,000	\$9.68 \$10.12 Delivery and stowing, 82 cents.	In bags; rapid; liable to interruption in May and from October to December.
Pondicherry, India.	Aug., 1883.	Welsh (poor)...	Good supply.	High.....	.....	.....
Negapatnam, India.	July, 1883.	Welsh.....	5,000	.....	High.....	Very poor.....
Jaffna, island of Ceylon.	.....	.....	.....	.....	.....	.....

* Coal owned by Netherland Steamship Company (India).

ports, together with the usual supply on-hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coal-ing port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None; Govt. contractors at Rangoon have branches at four leading ports of Burmah.	Coal pile near river bank; by coolies to lighters, thence to ship; $\frac{1}{4}$ to $1\frac{1}{2}$ miles.	None	Rangoon..	None	For small repairs.
Indian; Cardiff, 1,500; English, 700.	1 mile	None	Akyab, Bassein, Moulmein, Calcutta.	Gridiron; 350 by 50	Yes.
.....	.....	.....	Rangoon..	Small one; 170 by 44 by $11\frac{1}{2}$.	
None	$\frac{1}{4}$ mile	None	Chittagong, Calcutta, Rangoon.	None	None.
None .....	.....	None	Calcutta..	None	None.
British, at Trincomalee, Welsh on hand.	$\frac{1}{4}$ to $\frac{1}{2}$ mile	In Bengal, 1,000,000 output.	Point de Galle.	Eleven; Upper Union, 352 by 55 by 20-24; Lower Union, 340 by 72 by 18-22; Calcutta, 350 by 50 by $18\frac{1}{2}$ -20 $\frac{1}{2}$; others smaller; length given is on blocks.	Five.
None	750 yards	None	Galle, Colombo.	None	For simple repairs
.....	.....	.....	Madras .....	.....	
.....	.....	.....	Madras	None	Small.
.....					

Exhibit of coal to be had at the following Asiatic Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Trincomalee, Ceylon.	Jan., 1887.	Welsh, (Govt.)	Small ...	-----	-----	By lighters; rapid
Point de Galle, Ceylon.	Oct., 1887.	Cardiff..... Australian..... English.....	15,000 2,000	20,000	\$7.90 alongside, \$8.14 stowed.*	By lighters from the beach; in bags; rapid.
Colombo, Ceylon.	Dec., 1886.	Welsh..... English.....	100,000	100,000 {	\$8.63 \$8.03	By lighters; in bags; rapid; no interruption.
Bombay, India.	Dec., 1886.	Welsh..... English.....	40,000	40,000 {	\$6.25 to \$7 f. o. b.	By lighters; rapid; liable to interruption from May to November.
Knrrschee, India.	Dec., 1886.	Welsh..... English.....	1,000 1,200	2,000	\$7.80; 39 cts. additional for delivery and stowing.	-----
Bushire, Persia.	Nov., 1886.	-----	140	Not to be relied upon.	\$11.42	By 15-ton lighters; 8 tons an hour.

Exhibit of coal to be had at the following European Station

Peterhead, Scotland.	1886.	-----	-----	-----	-----	-----
Aberdeen, Scotland.	1886.	Scotch.....	1,500	1,500	\$2.50 to \$3.50 unscreened, stowed.	Rapid; rarely interrupted by heavy snow.
Dundee, Scotland.	Sept., 1883.	Scotch..... English.....	Large supply ...	-----	\$2.25 to \$2.75. \$3.75 to \$4.25. Stowing 25 to 37 cts.	At docks, by wagons. By lighters; rapid; in winter, in river liable to interruption.
Burntisland, Scotland.	-----	Scotch.....	60,000	100,000 to 150,000	\$2.16. Stowing 16 cts.	Chute and hydraulic tips; rapid; no interruption.

* German Government contract prices for Welsh.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops which steamers can repair.
Imperial.....	.....	.....	.....	None	None.
At Trincomalee. German, contract.	$\frac{1}{2}$ to 1 mile from anchorage to beach.	None	Colombo..	None	For slight repair.
None	Coal-sheds on beach, 500 to 1,000 yards.	None	Point de Galle.	None	Two; small repair coffer dam.
The M. M. Co. has 6,000, the Austro-Hungarian Lloyd's 2,000 tons.					
Imperial..... French at Mahé.	$\frac{1}{2}$ mile.....	None	Kurrachee	Ten; largest (P. and O.), 470 (436 on blocks) by 66 by 18-21 draught; 1 floating (5,000 tons), 380 by 85 by 29. Dry-dock charges 39 cts. ton (gross) for 1st 1,000, and 20 cts., for each additional ton for 1st day; \$39 a day afterwards. Floating-dock, special agreement up to 2,000 tons; upwards of that 29 cts. ton 1st day, \$39 a day thereafter; include docking, scraping, and painting.	Several; Richar & Creddar, Br dia S. N. Camac Iron Works Bowick & Stepi
.....	.....	.....	Bombay ..	Small one.....	Two; ordinary pairs.
.....	.....	.....	Kurrachee	.....	

ports, together with the usual supply on hand, cost, etc.

.....	.....	.....	Aberdeen.	Two; largest, 190 by 35 by 15.	
None .....	.....	None	Montrose, Peterhead.	One; 524 by 50 by 20; 3 slips; largest, 1,000 tons.	Good ones.
None	Brought direct from mines.	40 miles distant; 6,000 tons a day.	Burntisland.	Two; largest, 510 on blocks by 53 by 20.	Large ones; 70 cranes.
None	8 to 25 miles ..	2,000,000 annual output.	Leith	None	None.

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Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tone of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Leith, Scotland.	Oct., 1883.	Scotch	Not kept on hand. R. R. to collieries 15 miles. Large orders filled at short notice.	.....	\$2.40 free on board. Stowing 12c. to 16c.	By hydraulic cranes; very rapid; no interruption.
Blyth, England			Large supply .....	.....	.....	.....
North Shields, England.			do. ....	.....	.....	.....
South Shields, England.			do. ....	.....	.....	.....
Newcastle-on-Tyne, England.		English	do. ....	.....	.....	.....
Sunderland, England.			do. ....	.....	.....	.....
West Hartlepool, England.			do. ....	.....	.....	.....
Middlesbrough, England.						
Grimsby, England.	1886.	.....	.....	.....	.....	.....
Hull, England			Large supply .....	.....	.....	.....
Sheerness, England.						
Chatham, England.						

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	10 to 25 miles to collieries. Railroad.	Very extensive.	Burntisland.	Seven; largest, Prince of Wales, 370 on blocks by 70 by 20½-22.	Several large ship-building and repair shops.
.....		Extensive.	Tynemouth	One; 216 on blocks by 32 by 11½; a small floating dock.	Building facilities.
.....			Sunderland, Newcastle.	Three; largest, 295 by 48 by 16.	Do.
.....			do	Nine dry and 3 floating; largest, dry, 430 by 46 by 22; another to be made 500 by 50 by 22.	Do.
.....			Tynemouth, Sunderland.	Two; Hawthorn & Co.'s (Yarrow), 450 by 68 by 21; Palmer's (Hebburn), 440 by 70 by 17; Wallsend Slipway take vessel 320 feet long, 3,000 tons.	Do.
.....		Extensive; 4,000,000.	Tynemouth	Six; largest, 427 by 45 by 16½.	Do.
.....			Middlesborough.	Four; largest (N. E. Ry's Co.'s), 550 by 50 by 19.	Do.
.....			Whitby...	One; 500 by 50 by 16½; slip, 1,500 tons.	Do.
.....			Hull	Four; largest, 350 by 70 by 20.	
.....			Grimsby...	Twelve; largest, 550 by 65 by 21½.	Do.
.....			Tilbury...	Five; largest, 253 by 63.4 by 25½.	Dock-yard; any repairs.
.....			do	Seven; largest, 410 by 82 by 32.	Do.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Tilbury, Eng-land.	1887.	.....	Large supply.....			.....
London, Eng-land.	.....	.....	do.....		\$4.00	.....
Portsmouth, Eng-land.	.....	.....	do.....			.....
Southampton, Eng-land.	Aug., 1884.	Welsh.....	do.....		\$0.36 f. o. b.....	By lighters.....
West Cowes, Eng-land.	.....	.....				
Plymouth, Eng-land.	.....	.....				
Devonport, Eng-land.	.....	.....				
Falmouth, Eng-land.*	Sept., 1883.	Welsh.....	2,000	1,800	\$4.56 to \$4.80 stowed in bunkers.	From hulk alongside; 10 to 30 tons an hour; exceptionally heavy weather in winter interrupts.
Scilly Islands, Great Brit-ain.	Sept., 1883.	do.....	3,000	350	\$5.52 to \$5.76 f. o. b.	Coal hulk in deep water; rapid; heavy gale in-terrupts.
Appledore, Eng-land.	1886.	.....				
Bristol, Eng-land.	1886.	Local.....	Large supply.....			
Newport, Eng-land.	.....	.....	do.....			

* On entering, signal, Fox—C. W. T. L. Coal immediately, P. J. Hulks will be towed out to meet steamer.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal-pile to ship.	Coal mining in vicinity.	Next nearest coal-ing port.	Number and size of dry-docks.	Machins shops at which steamers can repair.
.....			London ..	Four; 2 of 32 and 2 of 27 feet draught, O. S. T.	Fifty-ton shears.
.....			Tilbury ..	Forty; Royal Albert, 520 by 68 by 22; West India, 466 by 64 by 21; Thames Iron Works, 430 by 65 by 18-23.	Numerous.
.....			Southampton.	Fourteen at dock-yard; take largest vessels; one, corporation, 349 by 50 by 17½.	At dock-yard.
.....			Portsmouth.	Four; largest, 523 by 80 by 25.	Building facilities.
.....			..do ..	One; 331 by 56 by 17.	
.....			Falmouth.	Two; largest, 450 by 80 by 18.	
.....			..do ..	Four at dock-yard; largest, 415½ by 73 by 31; three at Keyham, one 417 long, 27 draught.	Dock-yard; building facilities at Keyham.
None	Nil	None	Plymouth.	Two; largest, 510 by 71 by 22½.	Yes; iron vessels built and repaired.
None	Nil	None	Falmouth.	None	None.
.....			Cardiff ..	Two; largest, 321 by 42 by 17.	
.....			Newport, Cardiff.	Five; largest, Albion, 522 by 42½ by 14½.	
.....			Cardiff, Bristol.	Three; largest, 515 by 50 by 20.	

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Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Cardiff, Wales.	.....	Cardiff	Large supply		\$2.52 to \$2.64 f. o. b.	In docks; rapid; no interruption.
Swansea, Wales.*	Sept., 1883.	Welsh	do		\$2.70 f. o. b.	Rapid; no interruption.
Llanelli, Wales	Sept., 1883.	Welsh	2,500	100 to 200 received daily and shipped.	\$2.46	do
		Anthracite	2,500		2.40	
Milford, Wales.	1886.	Welsh anthracite.	400	400	\$4.38 f. o. b.	do
Pembroke, Wales.	.....	.....	Large supply			
Holyhead, Wales.	.....	.....	do			
Liverpool, England.	.....	.....	do			
Barrow, England.	.....	.....	do			
Ayr, Scotland.	1886	.....	do			
Ardroean, Scotland.	1880	.....	do			
Greenock, Scotland.	Sept., 1883.	Welsh	400	} 3,000	\$5.52	Alongside wharves; saves lighterage, but incurs harbor dues; 40 tons an hour; no interruption.
		Scotch	3,000		\$2.16 to \$2.52; lighterage, 36 cents; stowing, 36 cents.	

* Most important port of Bristol Channel.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal joining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	Nil	Extensive	Newport..	Nine; largest, 580 by 60 by 23; one floating 4,500 tons.	Numerous.
None	Coal sent to steamer.	Yes.....	Cardiff, Newport.	Eight; largest, 350 by 47 by 21½.	Several.
None	50 yards	Extensive	Baryport .	Marine railway, 800 tons.	Do.
.....			Llanelly ..	One; 300 by 46 by 15-16.	
.....			Milford ...	One, Government, 350 feet long; two private, largest, 250 by 48 by 11½.	Dock-yard; hulls built.
.....			Liverpool..	Three; largest, 402 by 70 by 20.	
.....			Barrow	Twenty-four; largest, 948 by 60 by 25; smallest, 277 feet long; several large ones at Birkenhead, opposite; charges, \$16.20 up to 100 tons, and \$1.46 for every 50 additional up to 4,000, for two tides.	Extensive ship-building works.
.....			Whitehaven.	One; 500 by 60 by 20; one floating, 5,000 tons; charges, from 200 to 2,000 tons register, £2 to £20, for two tides; entrance fee £2 additional.	Ship and engine building works.
.....		Yes.....	Greenock ..	One slip, 2,000 tons.....	Ordinary repairs.
.....		Yes.....	Greenock ..	One; 224 by 39½ by 12-16	
None	Nil; anchorage 1 mile from wharf.	20 miles distant.	Ardrossan	Five; largest, 635 by 60½ by 20; charges same as at Glasgow; 1 at Port Glasgow, 322 by 45 by 15.	Several ship and engine building works.

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Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Dumbarton, Scotland.	.....	.....	Large supply.....		.....	.....
Glasgow, Scotland.	.....	.....	do	.....	.....	.....
Londonderry, Ireland.	.....	.....	.....	.....	.....	.....
Carriekfergus, Ireland.	.....	.....	.....	.....	.....	.....
Belfast, Ireland	.....	.....	.....	.....	.....	.....
Dublin, Ireland	.....	.....	.....	.....	.....	.....
Waterford, Ireland.	Sept., 1883.	Welsh	Small .....	.....	\$4.80 stowed ..	Alongside wharf-boats; 100 tons a day; in bags.
Queenstown, Ireland.	Sept., 1883.	Welsh	1,200	1,200	\$5.28 to \$6.00 stowed.	By lighters and baskets; no interruption.
Cork, Ireland ..	Sept., 1883.	Welsh	2,000	2,000	do	At wharf; by carts and baskets.*
Limerick, Ireland.	.....	.....	.....	.....	.....	.....
Sligo, Ireland ..	.....	.....	.....	.....	.....	.....
Bergen, Norway.	Jan., 1884.	English..... Scottish..... Welsh	8,000 4,000	} 10,000	{ \$4.20 \$5.15 18 cts. per ton stowing.	Rapid; no interruption.

* Queenstown is a better coaling place.

ports, together with usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
			Greenock .	Two; one 300 by 41 by 11; other larger.	Ship and engine building works.
			Greenock .	Three; largest, 575 by 70 by 22; charges, \$11 for first 100 tons, and \$1.80 for each additional 50 tons.	Do.
			Belfast . .	One; 314 by 50 by 14½; charges, \$18.71; \$52.73 for vessels of 100 to 1,200 tons register.	
			Belfast . .	One; 165 by 33 by 8½ . . .	Ship-building yard.
			Dublin . .	Three; largest, 470 by 60 by 15½; 1 slip, 1,000 tons.	Ship and engine building works.
			Waterford	Four; largest, 412 by 70 by 16; charges, 12 cts. per register ton for first tide, 1½ cents for each tide thereafter.	Good ones.
None	½ mile	Anthracite, 30 miles inland; used for kilns.	Queens-town.	None	One small shop.
British; several thousand tons.	1 mile	None	Milford . .	At Passage West, docks will take heavy draught vessels; Government dock at Haulbowline, 485 by 94 by 32½.	Several; no heavy forging.
None	1 mile	None	Queens-town, Milford.	Three; largest, 480 by 54 by 16-19; 365 by 82 by 19-21.	Facilities for iron-ship building.
			Galway . .	Three; 428 by 45 by 17; 1 floating, 810 by 70 by 18-23.	Ordinary repairs.
None on west coast.	Stores close to sea; only a few yards.	None	Stavanger .	Three; largest, 251 by 66 by 15; 1 slip, 2,000 tons.	Two large ship-building yards and shops; 2 small repair shops; 2 wooden ship y'ds; 8 iron foundries.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Stavanger, Norway.	Jan., 1884.	English..... } Scotch..... }	2,000 to 3,000	2,000	{ \$4.14..... } { \$3.68..... } Stowing 18 c. per ton.	Slow; harbor protected except against N. W.
Christiansand, Norway.	Sept., 1883.	Welsh..... } Scotch..... }	3,700	3,000	\$4.80 to \$5.76..	In outer harbor; by lighters; interruption rare.
Arendal, Norway.	Dec., 1883.	English..... } Welsh..... }	1,400	1,400	{ \$4.32 at pile; \$4.86 along- side; \$5.40 in bunkers.	By lighters; 100 tons a day.
Horten, Norway.	.....	.....	.....	.....	.....	.....
Christiania, Norway.	Dec., 1883.	English..... } Welsh..... }	10,000	9,000	{ \$4.32 in bunk- ers.	Easy and rapid; no interruption.
Gothenburg, Sweden.	Sept., 1883.	English..... Welsh.....	4,000 2,000	5,000	\$3 to \$4.50; delivery and stowing, 42 cents.	With haskete or tube; not rapid; seldom interrupted by gales in the autumn.
Malmö, Sweden.	Sept., 1883.	English..... Scotch.....	12,300 2,500	9,000	\$3.36 to \$4.03; delivery and stowing, 62 cents per ton.	At wharves; in roads; by lighters; rapid; heavy gales sometimes interrupt.
Karlekrona, Sweden.	1886	.....	.....	.....	.....	.....
Norrköping, Sweden.	Sept., 1883.	English..... Scotch.....	500 1,500	2,000	\$4.86 in bunk- ers.	By lighters or at wharf; rapid; interrupted by ice from December to May.
Stockholm, Sweden.	Aug., 1883.	English.....	15,000	12,000	\$4.87 to \$5.36 Delivery and stowing, 36 cents.	By lighters; alongside wharf; rapid; no interruption.
Gefle, Sweden..	Sept., 1883.	English..... Welsh.....	3,500 1,500	5,000	\$3 to \$4 in bunkers.	By 50 to 150 ton lighters; rarely interrupted; most in November and December.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	Very short....	None	Bergen, Christian-sand.	Two dry-docks; 180 by 53.8 by 14; 300 by 45 by 12.4.	A machine shop, foundry and ship-yard. Another yard for wooden ship building.
.....	50 to 100 yards to lighters, thence to anchorage.	.....	Mandel, Arendal. (Access difficult.)	One dry-dock, 312 by 43 by 18.	Small steamers built and repaired.
None	1 to 2 cables' length.	None	Grimstad.	None	For minor repairs.
.....		.....		One; 336 by 61½ by 23½.	
None	1 mile.....	None	Gothenburg and Christiansand.	Two; largest, 275 by 46 by 13.	2 large shops.
None	16½-ft. draught come close to wharves; 20 feet lie 4 miles off.	Small; 80 miles distant.	Elsinore ..	One dry-dock, 340 by 50 by 20, for vessels of 3,000 tons.	Three.
None	At wharf 2,000 feet; in roads 2 miles.	Very limited; output consumed by railroad and factories.	Copenhagen.	One dry-dock, 235 by 34 by 12½ feet.	Yes.
.....		.....		Six Government; largest, 277 by 50.8 by 18.6.	
None	500 feet	None	Brevik ...	One dry-dock, 240 by 34 by 10.	For all kinds of repairs.
Swedish, 4,000 tons.	100 feet	None	Gefle, Norrköping, Oxelösund.	One Government dry-dock, 308' 6" by 59' 7" by 22' 7", at Beckholman; 2 dry-docks, 340' by 56' by 19'; 33' by 330' by 38' by 13'; 1 at South Oscarshamn, 329' by 41' by 14' 5".	At navy-yard, and two large private works.
None	½ to miles...	None	Söderhamn	None	Two.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Söderhamn, Sweden.	Sept., 1883.	Anthracite ...	500	500	\$4.80 in bunkers.	By lighters; no interruption.
Sundsvall, Sweden.	Sept., 1883.	English..... Scotch.....	800 400	2,500	\$4.59 alongside; stowing 34 to 48 cents.	By crane on wharf; or by lighter; rapid; no interruption except in autumn.
Helsingfors, Russia.	Nov., 1883.	English..... Cardiff.....	1,500 2,000	3,000	\$6.24 6.96 In bunkers.	No interruption
Wiborg, Russia.	Sept., 1883.	English.....	400	200	\$5.76 in bunkers.	do.....
Cronstadt, Russia.	Jan., 1884.	English..... Scotch..... Welsh.....	2,000	12,000	\$3.60 3.12 4.20 Stowing, 10 to 20 cts.	By lighters at rate of 10 tons per hour. In September and October storms interrupt in roads, but not in harbor.
Revel, Russia.	.....	Welsh.....	Good supply.	.....	.....	.....
Riga, Russia.	.....	English.....	4,000	6,000	\$4.08 to \$4.32 in bunkers.	By carts or lighters; slow. Ice may interrupt in winter.
Königsberg, Germany.	Sept., 1883.	English..... Scotch.....	1,500 6,000	10,000	\$3.84 to \$4.44 Delivery and stowing, 48 cts.	From collier alongside; no interruption.
Dantzio, Germany.*	Sept., 1883.	Scotch..... Silesian.....	3,000 1,000	8,000	\$3.60 4.08 Delivery and stowing, 80 cts.	Of 21 feet draught, coal in port. Men-of-war coal in roads with lighters. North or N.E. winds prevent lighters going out.
Stettio, Germany.	Sept., 1883.	English..... Welsh..... Silesian.....	3,000 1,000 Unlimited.	Any quantity.	\$4.56 5.04 4.56 per 1,000 kilos, in bunkers.	By lighters. Notice necessary; then rapid. Interrupted by ice in December, January, and February.
Röone, Denmark.	Sept., 1883.	West Hartley. Yorkshire	1,000 1,000	7,000	\$5.50 delivered.	Alongside bulkhead; 17 to 18 feet water; rapid.

* Neufahrwaeser is outer port of Dantzio. Stowing there is 36 cents per ton.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	2 to 12 miles ..	None	Gefle	None	None; at Ljusne, 20 miles to southward.
None	Short	None	Gefle	None	One.
None	Short	None	Reval, Abo	One dry-dock, 300 by 56 by 18.	In connection with dry-dock.
None .....	.....	None	Cronstadt, Helsingfors.	None	One.
None	$\frac{1}{2}$ to 6 miles ..	None	Petersburg, Revel, Ballieport, Helsingfors, Hango.	Two dry-docks and numerous floating docks to take largest ships.	Yes. Dock-yard.
None	Depots close to wharves; others at Mühlgarten and Bolderaa.	None	Windan, Libau.	Patent slip for vessels of 1,100 tons.	One; also one at Bolderaa.
None	Piles close to water's edge.	None	Dantzio ..	None	For small repairs.
None	In roads; 2 miles.	None	Pillan	One floating, 1,200 tons.	A ship-building yard fully equipped for all work.
None	100 to 200 yds.	Extensive; 320 miles distant; best quality steaming coal.	Kiel, Dantzic.	One iron floating dock, 210 by 47 by 14. Capacity, 1,500 tons.	Three; one for all repairs.
None	Short	None	Copenhagen.	None	One large shop.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Lubeck, Germany.	Sept., 1883.	West Hartley. German.....	3,000 Unlimited.	3,000	\$4.56 4.32 in bunkers.	By lighters; rapid. Gales may interrupt.
Copenhagen, Denmark.	Aug., 1883.	English } Scotch } dirty. Welsh }	30,000	30,000	\$7 to \$8	By 50-ton lighters; rapid. In outer roads, northerly winds and sea may interrupt.
Elsinore, Denmark.	Sept., 1883.	Welsh Newcastle } W. Hartley } Scotch	2,000 7,000 6,000	4,500 13,000 11,000	\$4.56 4.38 4.20 Stowed when vessel is in harbor.	At wharf, from piles close by. In barrels, by weight. Regulated by custom officials; 6½ barrels to the ton. Ice in January, February; rapid.
Kiel, Germany.	Sept., 1883.	Welsh Newcastle Scotch	2,000 2,000 3,000	100,000	\$7.20* 6.72 5.28 In bunkers when in roads.	By lighters; 200 to 500 tons daily, after notice. Ice may interrupt in January and February.
Cuxhaven, Germany.	Sept., 1883.	West Hartley.	400	500	\$6 if vessel is in harbor. If in roads, \$6.72 to \$6.96.	In harbor, with baskets; slow. In roads with lighters, and may be interrupted by storms in autumn.
Hamburg, Germany.	Sept., 1883.	W. Hartlepool. Sunderland. Cardiff.	Large supply.....		\$3.84 to \$4.08 in bunkers; \$5.28 to \$5.76 at city. If below, \$1.50 extra.	From lighters with baskets; rapid. In winter liable to be interrupted at times by floating ice.
Wilhelmshaven, Germ'y.	Sept., 1883.	German (of Welsh quality).	1,000	1,000	\$3.81 to \$4 in port. Delivery 25 to 50 cts. In roads by lighter \$1 to \$1.25	In roads by lighters; may be interrupted by storms and ice in January and February.
Brake, Germ'y.	Sept., 1883.	German Scotch	400 300	800	\$3.40 to \$3.60; delivery and stowing 25 to 50 cts.	Alongside wharf. Rapid, but liable to interruption from ice in December, January, and February.
Nordenhamm, Germany.	Sept., 1883.	German (same quality as Welsh). English	600 500	1,000	\$3.40 to \$3.65; delivery and stowing 25 to 50 cts.	Alongside wharf. Rapid, but liable to interruption by ice in December, January, and February.

* German Government contract for best Welsh (1888), \$5 f. o. b. at dock - \$5 alongside in roads,

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	10 miles.....	None	Wisnar ..	One dry-dock, 220 by 46 by 14; 1,500 tons.	Three.
Danish, at navy-yard; 2,000 tons.	$\frac{1}{2}$ to $\frac{3}{4}$ mile for inner roads for draught of 23 feet; 2 to 3 miles for outer harbor.	None	Elsinore ..	One Government dry-dock, 280 by 59 $\frac{1}{2}$ by 20 $\frac{1}{2}$; 1 private, 240 by 52 by 15 $\frac{1}{2}$; 3 private, and 1 Government slip. Capacity, 3,500 tons. Charges, 4 cents per gross ton for 5 days; 2 $\frac{1}{2}$ thereafter.	Ship-building and engine works for all kinds of work. Dock-yard.
None	At wharf, 60 feet. In roads, $\frac{1}{2}$ mile.	Near Helsingburg; not fit for steam coal.	Copenhagen.	One dry-dock, 320 by 40 by 12; 1 patent slip. At Helsingburg, 1 dry-dock, 276 by — by —.	One iron-ship building yard and shops. Repairs made to any extent.
German, at dock-yard. Can be obtained by rail from interior (Westphalia).	10 to 15 minutes' time.	None	Flensburg, Korsør, Nyborg.	Four dock-yards; largest 328 by 71.2 by 28.3. Private floating docks; largest, 200 by 54 by 17.	Several, excellent: including dock-yard.
None	Coal-yards near wharf.	None	Hamburg ..	At Hamburg.....	None.
None	Coal brought in colliers and unloaded into lighters.	None	Cuxhaven.	Five; 400 by 50 by 18, 4,000 tons; 540 by 52 by 15, 5,000 tons; 269 by 39 13; 260 by 50 by 14; 210 by 45 by 14.	Several.
German .....	.....	.....	Brake	Three dry-docks; 2 for frigates and cruisers; 1 for heaviest vessels of 25 to 26 feet draught.	Large; Government dock-yard.
None	100 to 200 yards	None. But coal from mines can be had to any quantity in 48 hours.	Norden-hamm.	Two; 300 by 38 by —; 343 by 45 by 13.2.	Of all kinds.
None	100 to 200 yards. 2 wharves.	None. But coal can be had from mines in 48 hours.	Bremer-haven.	None	Shops of all kinds.

86 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Bremerhaven, Germany.*	Sept., 1883.	German..... English.....	2,000 300	2,300	\$3.81; delivery and stowage 24 cents.	Alongside wharf, by wheelbarrows. No interruption.
Amsterdam, Holland.†	Sept., 1883.	Newcastle Yorkshire German.....	2,500 2,500 Larger amounts.	10,000	\$4.20 3.70 \$3.40 to \$3.89 stowed.	At wharf, with baskets of 1½ cwt. At anchorage, by lighters and baskets.
Rotterdam, Holland.	Oct., 1883.	German..... English.....	8,000 7,000	12,000 to 15,000	\$3.50 to \$4.00 \$4.50 to \$4.80 Delivery and stowing 25 cts.	At wharves and by lighters. Slow. Coal bagged. No interruption.
Flushing, Holland.	1885.	German..... English.....	600 900	900	\$3.50 to \$4.00 \$4.50 to \$4.80 Delivery and stowing, 25 cts. in harbor; in roads, 60 cts.	At wharves by bags; by lighters, 200 tons per day; may be interrupted in roads from October to March.
Antwerp, Belgium.	1886.	.....	Large supply	.....	.....	.....
Westend, Belgium.	.....	.....	.....	.....	.....	.....
Dunkirk, France.	Sept., 1883.	English..... French..... Cardiff.....	500 500	Variable	\$4.00 \$4.40 stowed. 5.60 stowed.	By lighters; ice may interfere in winter; in winter, freight 70 cts. per ton.
Calais, France.	Sept., 1883.	English..... French.....	3,000	3,000	\$4.40 Delivery and stowing, 40c.	Small lots from warehouses; large lots direct from collier in harbor; rapid; severe weather interferes.
Boulogne-sur-Mer, France.†	Sept., 1883.	.....	.....	.....	.....	.....
Dieppe, France.	Sept., 1883.	English..... } Scotch..... } Welsh..... }	8,000 16,000	300,000 per year.	\$5.60 in bunkers.	.....
Havre, France.	Sept., 1883.	.....	Large supply	.....	.....	.....

* North German Lloyd steamers drawing 25 feet to 26 feet enter the port.

† This German coal is stated to be as good as Welsh. The German transatlantic steamers and the German admiralty use it almost exclusively. For tests, see page 139.

ports, together with the usual supply on hand, cast, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	30 to 50 feet...	None; but coal can be had from mines in 48 hours.	Nordenham.	Five; largest, 370 by 58 by 19½.	Shops of all kinds. An iron ship-building yard has all facilities.
None	Coal sheds close to wharves for steamers' use only (private). Railroad runs alongside wharves.	None; coal mines at Westphalia. Freight is 97 cts. to \$1.21 per ton.	Any Dutch port.	Two; largest, 402 by 56 by 18; 4 floating; largest, 401 by 63.4 by 17.2.	Several, including dock-yard.
A Dutch Govt. station at Hellevoetsluis.	1 to 1½ miles...	None	Schiedam, Delfshaven	Two dry-docks can be made one. 295 by 60 by 30. 157 by 60 by 30. (6,000 tons).	Excellent.
None	1 to 1½ miles...	None	Middleburg	One dry-dock 243 by 16 by 13; 1 dry-dock at Middleburg 413 by 65 by 16.	Several; building facilities.
.....	.....	.....	.....	Eleven; largest, 411 by 81 by 23.	.....
.....					
French; received from Pas de Calais for the Navy.	English coal piles at wharves; carts to ship.	Pas de Calais mines, 50 miles distant.	Calais, Antwerp.	None. (Building intended.)	None. (Building intended).
None	Warehouses near harbor; cartage quick.	Extensive; 4,000,000 output; Pas de Calais.	Boulogne-sur-mer, Dunkirk.	None. (One to be built).	None; to be built in connection with Union dry-dock.
.....	.....	.....	.....	None.....	None.
.....	.....	.....	Havre, Boulogne-sur-Mer. §	None.....	None.
.....	.....	.....	.....	Four; largest, 426 on bottom (497 over all) by 99 by 28½; 1 floating, 210 by 40 by 14.	Yes.

† Same facilities as at Dunkirk and Calais.

§ Havre is the nearest port with repair facilities.

88 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Honfleur, France.	Sept., 1883.	Newcastle.... Cardiff..... Sootch.	.....	2,000. 50,000 imported yearly.	\$5.40 to \$5.60; stowing, 40c.	Slow; in port, no interruption; in bay, difficult and expensive.
Cherbourg, France.	July, 1885.	Welsh (not very good).	Small supply	Moderate	By lighters.....	
Guernsey, British.	Oct., 1883.	Welsh..... } English..... }	2,000 to 3,000.	28,000 consumed a year.	\$5.28 to \$6, including delivery.	Carried in bags on men's backs; slow; no interruption.
Jersey, British.	Oct., 1883.	Steam	500	2,000	\$5.28; stowing, 28c. to 40c.	By lighters or from wharf; slow; no interruption.
St. Malo, France	Sept., 1883.	Cardiff..... } Swansea..... } Newcastle .. }	40,000	30,000. 135,000 tons a year.	\$4 to \$6; stowing, 29c.	Rapid; no interruption.
St. Nazaire, France.	Dec., 1883.	Welsh..... Patent fuel ..	2,500	2,500 500	\$5 to \$5.20.....	Less than 27 feet, alongside wharf; by baskets; no interruption.
Brest, France..	Jan., 1886.	Various	1,000	1,000	\$6.50, f. o. b.; stowing extra.	By lighters and baskets; rapid; no interruption.
Nantes, France.	.....	.....	.....	500,000 tons imported annually.	.....	.....
L'Orient, France.	.....	.....	.....	.....	.....	.....
Paimboeuf, France.	1886	.....	.....	.....	.....	.....
La Rochelle, France.	Oct., 1883.	English..... Welsh..... French (hard and soft).	2,500 2,500 2,500	2,000 to 3,000.	\$4.80 to \$5 on wharf; stowing, 30c.	Rapid; no interruption other than failure of coal vessels to arrive; rarely occurs.
Roche fort, France.	1886	.....	.....	.....	.....	.....

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coal-ing port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	In harbor, 100 yards; at rivermouth in bay, 10 miles.	None	Havre	None	For minor repairs.
French, at dock-yard.	.....	.....	Honfleur..	Eight at dock-yard; 2 will take any vessel afloat. 1 private, 200 by 46 by —.	Yes. Dock-yard.
None	300 yards	None	Jersey....	Two patent slips	None.
None	Short hauling distance.	None	Guernsey.	None	Small.
None	None	None	Cherbourg	None .. (Building).	Only for slight repairs.
None	Coal is piled alongside quay.	None	La Rochello.	Three .. 460 by 82 by 24 (neaps) 492 by 59 by 24. 390 by 42.8 by 21.	Extensive; one of the depots of the Compagnie Transatlantique.
French	$\frac{1}{2}$ mile .....	.....	Cherbourg	Four Government, stone Over all. Entrance. 210 by 56 by —. 210 by 56 by —. double. } 500 by 60 by —. } 500 by 60 by —. 1 private proposed, 525 by 59 by 24.	Yes. Dock-yard.
.....	.....	.....	St. Nazaire.	.....	Yes.
.....	.....	.....	.....	Two Government .. 382 by 59 $\frac{1}{2}$ by 27 $\frac{1}{2}$. 492 by 70 by 38.	All works belong to the Government.
.....	.....	.....	.....	259 $\frac{1}{2}$ by 52 $\frac{1}{2}$ by 26 .....	.....
None	35 feet at most.	None	Bordeaux, St. Nazaire.	Gridiron for vessels 262 feet long.	Several.
.....	.....	.....	.....	Three at dock-yard (small).	At dock-yard.

99 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Bordeaux, France.	1886	.....	Large supply	.....	.....	.....
San Sebastian, Spain.	.....	.....	.....	.....	.....	.....
Bilbao, Spain	Jan., 1886.	Welsh English	750	750	\$7; f. o. b.; stowing extra.	By lighters and baskets; 10 to 12 tons an hour; no interruption.
Santander, Spain.	Aug., 1884.	None	None	None	.....	.....
Gijon, Spain	.....	.....	.....	.....	.....	.....
Ferrol, Spain	Dec., 1885.	Cardiff English	2,000 1,000	4,000	\$6.25	By lighters; 200 tons per day, except now and then in the winter.
Corunna, Spain.	Aug., 1884.	Cardiff English Spanish	3,000 2,000 500	4,500	\$6.33 6.00	By large lighters; rapid; no interruption.
Vigo, Spain	Oct., 1883.	Cardiff English Spanish	3,000 1,000 500	2,500	\$7 in bunkers. \$6.00	do.....
Oporto, Portugal.	Oct., 1883.	.....	4,000	.....	.....	.....
Liebon, Portugal.	Oct., 1884.	Welsh Scotch English	8,000 3,000	10,000	\$5.28 to \$6.26; f. o. b.	By lighters and baskets; 25 to 30 tons per hour; rarely interrupted.
Setubal, Portugal.	Oct., 1883.	.....	Small	.....	.....	.....
Huelva, Spain	Sept., 1883.	Welsh	.....	.....	\$6.27 to \$6.51; varies with English market.	Generally at wharf, from tugs and chutes; some- times by lighters; rapid, at wharves, and not interrupted.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal min- ing in vicinity.	Next near- est coal- ing port.	Number and size of dry- docks.	Machine shops at which steamers can repair.
				Two; largest, 511 by 72 by 26.2; 1 floating.	Yes.
	Half mile		Corunna	Two; 402 by 40½ by 13; 234 by 44 by 13 (can be made one).	Yes. Ship-building yard to be estab- lished opposite.
None		None	Gijon	None	None; go to Bilbao
Spanish	600 to 1,000 feet.	None	Corunna	One Government, stone, 475 by 82 by 32½.	Government dock yard.
None, but a contractor always has 1,000 tons for British fleet.	100 to 120 yds.	None	Ferrol	None	None.
None	500 yards	None	Corunna	None	None.
None (British con- tractor.)	One mile	None	Cadiz, Gibraltar, Vigo.	One Government, 318 by 56½ by 17; neces- sary to dredge in front of dock before docking a vessel; 2 smaller, private.	Several. Dock-yard.
None	Short	None	Cadiz	None	Two (one extensive).

92 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Cadiz, Spain*..	Mar., 1886.	Cardiff..... English..... Spanish.....	} 7,000 Small.	6,500	\$6.56	By 50-ton lighters, or at wharf; 150 to 200 tons in 12 hours; very severe weather in February and March may interrupt.
Seville, Spain..	Sept., 1883.	Cardiff..... Scotch..... Spanish.....	} 2,500 (Unlimited, on shore; notice.)	2,000 {	\$7.42 6.61 6.37 In bunkers.	At the wharf; no interruption except by extraordinary freshets.
Algeciras, San Lucar, Spain.	Sept., 1883.	.....	None ...	None ...	.....	.....
Gibraltar	Oct., 1886.	Welsh..... English.....	25,000 3,000	} 20,000	\$4.26 at hulk. 4.50 alongside 4.98 on deck. 4.80 f. o. b. Stowing 4 cts.	Steamers haul alongside hulks or colliers, or by lighters; 40 tons per hour. Liable to interruption from S.W. gales, from Jan. to March.
Malaga, Spain.	Sept., 1887.	Newcastle.... Cardiff.....	3,000 1,000	} 4,000	\$4.36 from steamer. \$5.82 from shore.	By 30-ton lighters. No interruption in harbor. In the roads S.E. winds interrupt.
Adra Marbella, Almeria, Spain.	Sept., 1887.	Welsh.....	200	200	\$4.86	By lighters, 15 tons an hour; no interruption.
Carthagena, Spain.	Aug., 1885.	Welsh..... English.....	Ample supply.....	.....	\$6.00 to \$6.50, f. o. b.	By lighters; rapid; no interruption.
Torre Vieja, Spain.	Oct., 1883.	.....	None ...	None ...	.....	.....
Alicante, Spain†	.....	.....	.....	.....	.....	.....
Denia, Spain...	.....	.....	None ...	None ...	.....	.....
Gracia de Valencia, Spain.	Sept., 1887.	English..... Cardiff..... Patent fuel ...	Few 1,000 1,000	} 2,200	\$6.48 6.72 5.76 } stowed.	By lighters and baskets, 80 to 100 tons per day.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
Spanish, at Carracas arsenal; 2,000 tons Cardiff and Spanish on hand.	Coal piles on wharves.	None	Gibraltar	Three at Carracas arsenal; largest, 344 by 72½ by 19½; one at Trocadero, 492 by 62½ by 26.	Several; facilities for heavy repairs.
None	Foreign coal on wharves and in city; Spanish brought from mines by railroad to wharves.	On a small scale at Villa Nueva del Rio; 47,000 output (inferior).	Cadiz	None	Extensive.
None .....	.....	None	Gibraltar, Sevilla.	None	None.
British, at dock-yard, 6,000 tons.	British vessels go alongside coal wharf. Coal by baskets and hired labor.	None	Cadiz, Cartagena, Malaga.	None	One shop on the north point outside gates of fort. Good facilities. Owned by English firm at Cadiz.
None	1 mile	None	Gibraltar	None	Ordinary repairs.
None	100 yards	None	Cartagena.	None	Poor.
English	1 mile	None	Gibraltar	Floating dock at arsenal, 350 by 114 by —.	Yes. Dock-yard.
None .....	.....	None	Cartagena.	None	None.
.....	.....	.....	Valencia..	None .....	.....
None .....	.....	None	Valencia, Alicante.	None	None.
None	200 to 800 y'de.	None	Alicante..	None	Several.

† Always good supply.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Tarragona, Spain.	Oct., 1888.	Welsh Scotch	500 500	} 1,000	\$7 to \$8 per 1,000 kilos in bunkers.	By lighters and baskets; 100 tons daily. In winter much delay from winds.
Barcelona, Spain.	Mar., 1887.	Welsh English Scotch	8,000 6,000 1,000	} 25,000	\$7.20 6.72 6.24 Stowing, 48c.	By lighters, 500 to 600 tons per day, in summer; in winter, 300 to 400. Feb. and March rarely, but may be interrupted by boisterous weather.
Port Mahon, Spain.	Nov., 1884.	Cardiff	Ample supply.....		\$8.50 delivered.	By lighters; 200 tons daily.
Palma, Spain...	Oct., 1883.	Cardiff	1,500	1,500	\$9.50. Stowing, 12 cents.	At wharf for merchant steamers. For men-of-war, $\frac{1}{2}$ mile lighterage. No interruption.
Cette, France*	.....	French English Patent fuel	1,000 3,000	200,000 yearly demand.	\$5.80 6.40 6.20	From warehouses or railroad cars to lighters to ship. Bad weather prevents lighters going alongside.
Marseilles, France.	Jan., 1888.	English Welsh French Patent fuel	Ample supply..... do do do		 \$4.87 3.40 to 4.40 6.80	With baskets—alongside wharf.
Toulon, France	.....	.....	do			
Villefranche, France.	Jan., 1886.	Cardiff	1,500	1,500	\$7.50 f. o. b.; stowing 60 cts. to \$1.	By large lighters.....
Cannes, France	.....	Forge Household	500 500	1,000 to 1,500.	.....	No facilities.....

* Large quantities can be brought from mines in 12 to 24 hours, but R. R. Co. allowed 6 days' delay.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None	$\frac{1}{2}$ mile cartage, $\frac{1}{2}$ mile light-erage.	None	Barcelona	None	None.
None	700 yards.....	At San Juan de Albadessa about 100 tons daily (poor article).	Tarragona	One slip for vessels of 500 tons; 1 floating dock to be built 2 miles off.	Two.
None	$\frac{1}{2}$ mile lighterage.	None	Barcelona.	None	None.
None	$\frac{1}{2}$ mile.....	None	Mabon.... Barcelona.	None	None.
None	Very short...	In dept. of Gard are Beasegés, Grand Combe, & Portes; also at Herault, mines of Graissac, 100 miles.	Marseilles	None	Several small ones.
.....	Very short....	Large.....	Cette	Six; largest, 563 by 61.4 by 23. 1 floating dock.	Several.
.....	.....	.....	.....	Seven Govt. stons dry-docks: <i>Overall. Top. H. W.</i> 440.8 by 94.6 by —. 440.8 by 14.6 by —. 336.7 by — by —. 396.9 by — by —. 545.8 by — by —. 304.6 by 71.4 by —.	Yes. Dock-yard.
French contractor 450 tons.	.....	None	Nice	None	Good works at Nice for small work.
.....					

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tone on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Monaco.....	.....	None .....	.....	.....	.....	No facilities.....
Savona, Italy ..	July, 1886.	Welsh	1,000	1,000	\$5.25 in bunkers.	Baskets—alongside wharf; rapid.
Genoa, Italy ...	Oct., 1886.	Cardiff, English, Scotch.	Large quantity		\$4.45 to \$5.20	350 to 400 tons per day; no interruption.
Spezia, Italy....	Jan., 1884.	Cardiff..... English.....	250 300	} 600	{ \$9.00 8.00	By lighters; 50 tons per day.
Leghorn, Italy.	Oct., 1886.	Cardiff..... Newcastle....	} 5,000	5,000	{ \$5.26, stowed in bunkers.	Large lighters; no interruption.
Bastia, Corsica (French).	.....	.....	.....	.....	.....	.....
Civita Vecchia, Italy.	Sept., 1883.	Cardiff..... Gas coal	2,500 3,000	1,500 1,000	\$7.72 0.76 Delivery and stowage, 48½ cts.	By lighters; 150 tons daily; rarely interrupted, and then during winter.
Naples, Italy*..	Mar., 1886.	English, Cardiff.	Large quantity.		\$5.11 f. o. b....	By lighters; by hand; slow; no interruption.
Castellamare, Italy.	Jan., 1885.	Welsh	100	100	\$6.00, stowed..	By lighters.....
Messina, Sicily.	Apr., 1886.	Cardiff	Very large.	100,000 imported in 1883.	\$5.50 f. o. b ...	By lighters, with baskets; rapid.
Catania, Italy..	Nov., 1883.	English..... Welsh	750 200	1,500	\$6 to \$6.60 \$5 to \$5.40 Delivery and stowing, 50 to 60 c.; labor, 70 cts. per day.	By lighters; slow; occasional interruption by heavy storms or southeast wind during equinox.

* Gun factory in course of construction at Pozzuoli (March, 1887). No forging. Ship-building yard also in construction.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
.....	.....	.....	.....	None	None.
.....	On wharf.....	.....	Genoa	None	For light repairs.
None	Short	None	Spezia, Leghorn.	One; 293' 11" by 70' 2" by 21' 11"; 1 floating dock 321 by 81' 11" by 17; no tide; marine railway, 1,000 tons.	Yes, inside and immediately outside city.
Italian	$\frac{1}{2}$ mile.....	Of inferior lignite, 30 miles distant.	Genoa, Leghorn.	Four at dock-yard; largest, 398 by 85 by 27 $\frac{1}{2}$; 1 building will take the <i>Lepanto</i> .	At dock-yard.
None	365 yards.....	None.....	Genoa	One dry-dock, 344 by 72 by 24' 3", is now being lengthened to 442' 9"; 2 slips, 1,500 tons.	For all kinds of repairs and for building.
.....					
Italian; in arsenal 500 tons.	$\frac{1}{2}$ mile.....	None.....	Leghorn, Naples.	None	One for ordinary repairs.
Italian	300 to 500 feet.	None.....	Messina, Leghorn.	One Govt., 239 by 63 by 19 $\frac{1}{2}$.	A Government yard and numerous private shops.
.....	Short .....	.....	Naples .....	.....	Government ship-building yard.
Italian .....	.....	.....	.....	One dry-dock, granite, 360 by 80 by 26. Charges: Over 400 tons burthen, pay \$62 for 400 tons, and 8 cts. for each ton over; \$20 for shoring, etc.; one-half charges after first day.	Small.
None	$\frac{1}{2}$ to 1 mile	None.....	Messina	None	One good shop.

98 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Syracuse, Sicily						
Licata, Sicily	Oct., 1883.	English Cardiff.....	2,500 700	} 2,000{	\$6.00 Delivery and stowing, 72c.	Rapid; liable to interruption in winter; harbor to be protected.
Girgenti, Sicily	Dec., 1886.	Welsh ..	Ample supply.		\$6.75 f. o. b....	By lighters; rapid
Cagliari, Sardinia.		Cardiff.....	1,200	1,300	\$8 per 1,000 kilos. Delivery 50c.	By 40-ton lighters and tugs; interrupted very rarely in winter by storms.
Palermo, Sicily.	Nov., 1886.	Welsh English	4,000	} 4,000 to 4,500. {	\$5.98 5.50	By lighters; slow; liable to interruption in winter by heavy seas.
Milazzo, Sicily.						
Marsala	Oct., 1883.	English, Cardiff.	100	50 to 100	\$7.00; delivery 40c.	By lighters; liable to interruption from October to May by heavy seas.
Malta*	Oct., 1886.	Welsh	Large supply.		\$5.16.† Stowed.	From covered stores by lighters with baskets; only interrupted by extraordinary storms.
Bari, Italy.....	Oct., 1883.	Cardiff..... French	}	15,000	 {	At wharf; brought in carts; rapid.
Rodi, Italy†	Sept., 1883.		None ..	None ..		
Venice, Italy ..	Sept., 1883.	Cardiff, English, Scotch, Istrian.	22,800	25,000	\$5.50 to \$6.50. Subject to variation; delivery, and stowing 70 to 70c.; not outside port.	By lighters, tubs, and baskets; very slow; no interruption.

* The Government dock-yard is thoroughly equipped, even for constructing.

† German Government contract (Oct., 1887), for Welsh, \$4.62 alongside; \$4.74 stowed.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
Italian..... 700 tons for R. R. use.	250 yards.....	None.....	Girgenti..	None	None.
None	If in harbor, less than 1 mile; if in outer bay, 3 to 4 miles.	None.....	Licata	None	None.
Italian..... 2,000 tons Cardiff.	1 mile	On a very small scale; unfit for steamers.	Leghorn, Naples.	None	One.
Italian, 1,000 tons.	10 yards to 1 mile.	None	Girgenti, Marsala.	None	One belonging to steamer company; light repairs.
None	1 mile.....	None	Palermo ..	None	None.
English, 30,000 tons. Welsh.	½ mile.....	None	Catania...	Two Govt.: 523 by 74 by 25; 468 by 80 by 33; third to be finished by latter part of 1888; 2 hydraulic docks, 2,500 and 1,200 tons.	Excellent. Dock-yard.
None		None	Brindisi...	None	Several, for repairs to engines.
None; nearest at Ancona.		None		None	None.
Italian, 15,000 tons in arsenal. Austrian 15,000 tons at Pola and Gragnano opposite shore of Adriatic.	Less 21 feet draught at wharf; above, in harbor 1 to 1½ miles distant.	At Isetria in Austria near Trieste secondary quality; also lignite mine 50 miles n.w. of city; unfit for steaming.	Trieste. At Pola Govt. sta'n coal is better and cheaper.	Two dry-docks at Govt. arsenal. 411.5 by 81 by 28. 295 by 59 by 19½.	Several large works, including dock-yard.

‡ No harbor here; only open beach.

100 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Trieste, Austria.*	Oct., 1883.	Welsh English Austrian Scotch	2,000 150 Unlimit'd 1,500	} 3,000	\$6.96 to \$7.20. Delivery 72 to 96 cents.	By lighters; 150 tons per day. Liable to interruption in November and December.
Pola, Austria.						
Fiume, Austria	Oct., 1883.	Welsh English	} 1,300	1,000 to 1,500.	\$6.96 to \$7.20. Delivery 72 to 96 cents.	By lighters; 150 tons per day. Liable to interruption in November and December.
Cattaro, Austria.†	1886.	None for sale (Gov't).				
Corfu, Greece.	Sept., 1883.	English Cardiff	1,000 500	1,000	\$8, alongside; delivery and stowing 50 cents.	By lighters; 200 tons per day. In winter may be interrupted frequently by NW. to NE. winds.
Cephalonia, Greece.‡	Sept., 1883.	Welsh French	760 350	1,200	\$6.60 to \$7.20, \$6 f. o. b.	40 to 50 tons daily. May be interrupted in December and January.
Zante, Greece§.	Nov., 1887.	Cardiff English Welsh	500 600 100	1,000 to 1,500.	\$6.75 to \$9.65 stowed. Delivery and stowing 96 cents.	By lighters; poor facilities.
Patras, Greece.	Sept., 1883.	English	4,500	2,000	\$7.80 to \$9.60 f. o. b., according to stock on hand.	By lighters; 200 tons in 12 hours. Rarely interrupted.
Syra, Greece...	July, 1886.	English Cardiff	5,000 2,500	} 5,000	\$6.08 f. o. b.; stowing 24 cents.	By lighters; no interruption.
Piræus, Greece	Sept., 1883.	Cardiff English	6,500 3,500	7,000	\$5.28 to \$5.52; \$5.04 to \$5.28; delivery 96 cents.	Slow. Interrupted in spring by heavy rains.

* Austrian coals are unfit for naval use.

There is an Austrian coaling station at Gravosa, and a naval establishment at Sebenico, 1886.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coal stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coal-ing port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
Austrian; at Pola, Cardiff and Austrian.	$\frac{1}{2}$ mile.....	In Dalmatia & Istria to small extent. More extensive in Moravia and Bohemia, 5 days distant; & in Hungary & Croatia, 3 days. Styrian mines 1 day.	Finme	One dry-dock for heavy iron-clads not more than 350 feet long; 370 by 66 by 27; 1, 382 by 73 by 20; 1 slip, 1,000 tons.	All kinds of repairs done. Government works where the largest iron-clade of the Navy have been built.
Austrian .....	.....	.....	.....	Two Govt.; largest 411 by 80 by 27; 1 balance dock, 300 by 83 by 23.	Dock-yard.
Austrian at Pola.	$\frac{1}{2}$ mile.....	As stated for Trieste.	Trieste ...	None	None.
Austrian .....	.....	.....	.....	.....	.....
At times Greek Government has few tons in store.	$\frac{1}{2}$ mile.....	None	Brindisi ..	None	Only for small repairs.
None	$\frac{1}{2}$ mile.....	None	Zante.....	None	None.
Greek; Cardiff at Navarino.	If not over 1,000 tons register can coal in harbor, otherwise $\frac{1}{2}$ to $\frac{1}{2}$ mile.	None	Cephalonia, Patras.	None	None.
Greek, 500 tons.	$\frac{1}{2}$ mile.....	None	Zante.....	None	None.
None	$\frac{1}{2}$ mile.....	None	Piræus ...	Two patent hydraulic slips of the Hellenic Steamship Company.	Shops of the Hellenic Steamship Company.
None	Not far, if steamer is in port.	At Konmi, island of Euboea; not good for steamers.	Syra, Patras.	None	Two for small repairs.

† Coal mostly in hands of mill-owners

§ Labor is cheapest in May, June, and July. In August, September, and October add 48 cents per ton.

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Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Ergasteria, Greece.	Mar., 1886.	Newcastle ---- } Welsh ----- }	1,000	1,000	\$4.50 f. o. b.	By lighters; 30 tons an hour.
Salonica, Turkey.	Sept., 1883.	Cardiff (double screened).	1,200	1,200	\$6.72 to \$7.68 in the bunkers.	By lighters; pretty rapid; sometimes interrupted from June to Aug. by wind.
Dardanelles, Turkey.*	May, 1884.	Welsh -----	1,000	200 to 1,200.	\$6.80 to \$7.29..	By 5-ton lighters; slow; 30 to 100 tons daily; frequently interrupted, especially in winter.
Constantinople, Turkey.†	Sept., 1885.	Welsh ----- English ----- Turkish -----	20,000 11,000 (small.)	15,000 to 20,000	\$6.54 5.75 Stowed.	By 30-ton lighters; after day's notice; rapid; in winter s'ly give trouble, but no trouble in Golden Horn.
Sulina, Turkey.	Jan., 1885.	Welsh ----- } Newcastle ---- }	5,000	5,000	\$6 f. o. b.; stowing extra.	Alongside wharf; rapid.
Odessa, Russia.	Jan., 1885.	Various -----	40,000 to 50,000	40,000 to 50,000	\$6 f. o. b.; stowing extra.	Alongside wharf and by lighter; 15 cts. ton for lighter.
Sebastopol, Russia.‡	1887					
Poti, Russia...						
Trebizonde, Asiatic Turkey.						
Rousschouk, Bulgaria.§	Sept., 1883.	Cardiff ----- Native -----	600 2,600	260 2,500	\$9 to \$10; \$6 per 1,000 kilos; delivery, 20 to 40c.	Laborers with baskets; pretty rapid. When Danube is full of floating ice it is dangerous to remain in port.

* The coal named is imported by tug-boat company for its own use, 3,000 tons annually.

† Steamers pay no duty; duty 56 cents per ton.

‡ Russian naval station contemplated at Novorossisk.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
.....	½ mile.....	.....	Piræus ..	None	None.
Turkish, Heraclea, and Black Sea coal; no fixed quantity.	Deposits 50 yards from wharf; ½ mile from wharf to vessel.	Several deposits not mined.	Any port of importance.	None	None.
Turkish; 200 to 300 tons Black Sea coal; often no coal.	Coal stores on beach, ¼ mile thence to steamer.	None	Smyrna, Constantinople.	None	One for light work.
None	½ mile.....	At Heraclea and other places in Black Sea; inferior quality and supply uncertain.	Smyrna, Salina.	Four dry-docks; 340 by 96 by 36; 215 by 85 by 25' 11"; 240 by 65 by 25' 9"; 235 by 55 by 25' 9"; Nos. 3 and 4 can make one dock of 505 feet long; 1 floating dock, 1,500 tons.	Several good private works; gov't works in dock yards in Golden Horn.
.....	Very short .....	.....	Constantinople.	None	.
.....	½ mile when lightering.	Good coal in the Donetz district.	Salina	None	Several; prices moderate.
Russian .....	.....	.....	Odessa	One Gov't, 600 by 85 by 27; 1 floating, 6,000 tons.	Large ones. Dock-yard.
.....					
.....					
Bulgarian, 355 tons; Cardiff.	Coal stores on river-bank, 30 to 100 yds. according to state of river.	None	Giurgevo, in Roumania.	One dry-dock at Turno-Severin, 300' long; probably very shallow; for river steamers; no other in lower Danube.	Two. Naval arsenal; railroad shops.

§ Small quantity of Cardiff briquettes owned by railroad company, 2 miles distant; Funfkirschen (native) to any amount on 3 weeks' notice, provided there is water enough at Iron Gates and no ice in river.

104 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Mytilene, Asia Minor.	Sept., 1883.	Cardiff Turkish	380 } 110 }	500	\$3.64 to \$3.88; \$6 to \$6.24 in bunkers.	By lighters and bags; slow. Sometimes interrupted in winter; not often.
Smyrna, Asia Minor.	Nov., 1887.	Newport..... Cardiff.....	400 } 4,000 }	3,000	\$4.86	By lighters, and small baskets by laborers; 30 tons per hour; seldom interrupted, then in Feb. and March.
Castro, Island of Chios.	Oct., 1885.	Newcastle (poor).	Small quantity for local use.		\$5.76	No facilities.....
Vathi, Island of Samos.	Oct., 1885.	None				do
Rhodes	Oct., 1885.	Welsh (poor) ..	60	60	\$6.95	do
Limasol, Cyprus.	Oct., 1885.	Welsh (poor) ..	25	25	Variable	do
Latakia, Syria*						
Beirut, Syria ..	Oct., 1887.	Patent fuel ... Cardiff..... Newcastle	2,000 } 200 } 800 }	3,000 }	\$3 to \$3.50 stowed.	Slow from December to April. In fine weather 150 tons from depot to ship.
Haifa, Sidon, Alexandretta, Tripoli, Mersine, Syria.	Oct., 1883.	None	None ..	None ..		
Jaffa, Syria	Oct., 1883.	Cardiff..... } English..... } French briquettes.	70	500	\$9.00 to \$10.00 8.00	{ May be interrupted by storms from November to April.
Port Said, Egypt.	Oct., 1886.	Cardiff..... } Newcastle .. }	Largo quantity....		\$5.10, f. o. b. †	Rapid

* No facilities for coaling.

† German Government contract price (October, 1887) for Welsh: \$4.86 alongside; \$5.04 stowed.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None Turkish coal mentioned owned by Turkish Gov't.	$\frac{1}{2}$ mile.....	None	Smyrna...	None	None.
Turkish; 500 tons Cardiff.	$\frac{1}{2}$ mile.....	None; coal deposits not mined.	Beirut	None	Several large works; one has 10-ton steam-hammer.
None	$\frac{1}{2}$ mile.....	None	Smyrna...	None	A small one.
None			Smyrna...	None	None.
None	$\frac{1}{2}$ mile.....	None	Port Said, Smyrna, Alexandria.	None	None.
None		None	Port Said, Alexandria.	None	None.
None					
None A deposit of French briquettes for the navy, 2,000 tons, at \$8.25.	$\frac{1}{2}$ mile.....	None in Syria or Palestine.	Port Said.	None on Syrian coast...	None.
None		None	Port Said.	None	Blacksmith shops.
None	One-half to 1 mile.	None	Port Said.	None	None.
German, contract.		None		None	Two; ordinary repairs; charges exorbitant.

06 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Alex, Egypt ...	Oct., 1885.	Welsh	3,000	3,000	\$8.53	By lighters.....
Akum, Egypt	May, 1885.	Welsh			\$11.56, stowed.	
Brim Island, Straits of Babel-Mandeb.	Feb., 1884.	Australian....	Large supply.....		\$8.00 to \$8.50	60 tons an hour.....
Aden, Arabia..	Oct., 1886.	Cardiff..... } Newcastle... }	Large quantity....		\$8.00 to \$8.50, stowed.*	By bags, 1 cwt. each; rapid: vessels drawing over 22 feet lay in outer harbor; liable to short delay from rough water in June, July, and August. SW. monsoon.
Insost, Arabia	Oct., 1886.	None	None ...	Not to be relied upon.		
Alexandria, Egypt.	Jan., 1886.	Cardiff.....	Large quantity....			
Tripoli, Tripoli						
Suez, Tunis...	Nov., 1886.	Welsh	500	500	\$5.00 f. o. b.; stowing extra.	By lighters; 15 tons an hour.
Oran, Algeria..						
Algiers, Algeria	May, 1886.	Newcastle	1,000	1,000	\$4.63	By lighters; rapid; no interruption.
Oran, Algeria..	Oct., 1887.	Welsh	3,000	3,000	\$4.37 to \$4.86	By lighters; 15 tons an hour.
Oran, Algeria..	Nov., 1885.	Welsh..... } English..... }	500	500	\$6.25 to \$7.25	By lighters; slow; interrupted by NW. wind.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
				One; 400 by 73.10 by 23.	
French		None	Aden	None	None.
German, contract.	Inner harbor, one-half mile; outer, 2 miles.	None	Bombay, Suez.	None	Two; for small repairs.
British					
				One, floating; 463 by 78½ by 20; 5,000 tons.	Yes.
				None	
None	1½ miles		Bona	None	
French torpedo boat station; 4 boats.					
	¾ mile		Gibraltar, Malaga.	Two; 377, on blocks, by 84 by 24½; 186 by 70 by 17½. Charges: small dock, \$120 entrance, \$15 each day, and \$30 for shoring, etc.; large dock, \$200, \$30, and \$50.	Yes; far from landing; prices high.
None	½ mile		Algiers	None	Ordinary repairs.
	Coal in hulk at anchorage.		Gibraltar	None	Small shop; prices high.

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Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
etuan, Morocco.						
ungier, Morocco.	Nov., 1884.	English.....	Small supply			Poor facilities.....
raiohe, Morocco.						
bat, Morocco						
sa Blanca, Morocco.						
zaguan, Morocco.						
fi, Morocco.						
ogadore, Morocco.						
orta, Fayal, Azores.	May, 1885.	Welsh.....	500	2,800	\$7.20, alongside; stowing, 12 cts.	By 20-ton lighters; rapid; seldom interrupted, then from November to March.
acioea, Azores.	1885.	None.....				
. Michael's, Azores.	.....	Welsh.....	3,000	3,000	\$7.40, stowed..	Alongside wharf and by 20-ton lighters; rapid; seldom interrupted, then from November to March.
inchal, Madeira.	Mar., 1887.	Welsh.....	5,000	10,000	\$6.05, stowed..	With steam-winches; rapid; no interruption.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
None		None	Gibraltar	None	None.
None	300 to 1,200 yds.	None	St. Michael's.	None	Yes.
None		None	Fayal	None	None.
None	300 to 1,200 yds.	None	Fayal	One floating dock; 183.7 by 43½ by —; capacity 1,500 tons.	Yes.
None	½ mile	None	Santa Cruz de Tenerife.	None	One forge; slight repairs possible.

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Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Teneriffe, Canary Islands (Port of Santa Cruz).*	Dec., 1886.	Welsh English	6,000 1,000	6,000 1,000	\$6.50, stowed..	By two 100-ton lighters and numerous small ones; from November to March gales may interfere; 600 tons daily.
Las Palmas, Gr'd Canary Islands.	Apr., 1887.	Welsh } English }	20,000	20,000	\$5.10, stowed..	By 12-ton lighters; 300 tons daily; northeast gales interrupt in winter.
St. Vincent (P'to Grande), Cape Verde Isl'ds.	Feb., 1888.	Welsh } English }	40,000	15,000	\$6.57, stowed..	By lighters and tugs; 200 tons daily; no interruption.
Santiago (Porto Praya), Cape Verde Isl'ds.	Feb., 1884.	Welsh	Small ...	200	\$9.25, deliv'rd; stowing, 24 cents.	By lighters and tugs; no interruption except in October and November for a few days.
Sal Isle, Cape Verde Isl'ds.	Oct., 1883.	None	None ...	None ...		.....
Freetown, Sierra Leone, Africa.	Jan., 1887.	Cardiff Patent fuel....	2,300 500	1,800 500	\$9, stowed..... \$10.00	By 5-ton lighter; slow; much rain in June, July, and August; in October and April light tornadoes.
Monrovia, Liberia.	Dec., 1886.	None	None ...	None ...		.....
Dakar, Senegambia.	Mar., 1885.	Cardiff } Patent fuel.. }	Large quantity ...		\$9.20, alongside	{ By lighters of 40 to 50 tons.
Bathurst, West Africa.	1884.	.....				By flat-bottom boats; tornadoes in July.
Elmira, Guinea	1884.	Patent fuel....	300			Surf-boats; slow
Cape Coast Castle, Guinea.†	1887.	.....				From hulk; slow

* No other port of island can be depended upon for coal; sometimes coal can be had. German contract price \$5.22 alongside; \$5.34 stowed; October, 1887.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal mining in vicinity.	Next nearest coaling port.	Number and size of dry-docks.	Machine shops at which steamers can repair.
French; German; Spanish; contractors 1,000 tons each of Welsh.	600 to 800 yds.	None	Las Palmas, Gr'd Canary.	None	For small repairs.
None	$\frac{1}{2}$ to $\frac{3}{4}$ miles.	None	Santa Cruz, Tenerife.	None	For small repairs.
German	600 to 800 yds.	None	Santiago, Cape Verde Islands.	None	Two, for light repairs.
None	600 to 800 yds.	None	St. Vincent, Cape Verde Islands.	None	None.
None		None	St. Vincent, Santiago.	None	None.
British; 500 tons; patent fuel.	300 to 500 yards	None	Bathurst, Gambia, Bonny.	None	None.
None		None	Freetown, Sierra Leone.	None	None.
			Bathurst.		

† There are two yards for building lighters, schooners, and boats.

‡ Jelli-Koffe, 80 miles west of Acra, is an excellent place for provisions. English line of steamers will furnish coal along Gold Coast for £2 10s. to £3, f. o. b.

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Exhibit of coal to be had at the following European Station

Name of port.	Date.	Kind of coal on hand.	Tons of each at date.	Average tons on hand during year.	Cost per ton.	Manner of coaling, rapid or slow, etc.
Lagos (British), West Africa.	1884.	-----	-----	-----	-----	By flats; slow; heavy rollers from June to August.
Fernando Po, Gulf of Guinea.*	1884.	Patent fuel ... Welsh N. Country.	800 to 1,000	900	-----	Government lighters, towed by ship's boats; slow.
Libreville, Gaboon River, West Africa.	Jan., 1887.	Patent fuel† ..	1,200	1,200	\$8, alongside..	By lighters; slow
Banana, Congo River, Africa.	Jan., 1887.	Cardiff.....	1,500	2,000	\$12.00 62 cents extra to vessels outside Ba- nana Creek.	By small steamers; moderately rapid.

* German contract (1887) for Westphalian at Cameroon, \$10.

† Belongs to French Government.

ports, together with the usual supply on hand, cost, etc.—Continued.

Government coaling stations in vicinity.	Distance from coal pile to ship.	Coal min- ing in vicinity.	Next near- est coal- ing port.	Number and size of dry- docks.	Machine shops at which steamers can repair.
German, con- tract at Cameroon.	Short				
			Fernando Po.	None	None.
				None	None.

II.

RELATIVE MERITS OF ANTHRACITE AND BITUMINOUS COAL,
AND ANALYSES OF DIFFERENT KINDS OF COAL.

DISCUSSION OF THE MERITS OF ANTHRACITE AND BITUMINOUS COALS.

BY CHIEF ENGINEERS CHARLES H. BAKER AND F. G. MCKEAN, U. S. NAVY, MEMBERS OF BOARD TO REPORT UPON THE COMPARATIVE MERITS OF COAL FOR NAVAL USE.

The Board having been called upon, in 1884, by the honorable Secretary of the Navy to state the advantages and disadvantages of anthracite and bituminous coal, has taken the liberty to introduce into the comparison the consideration of semi-bituminous coal also. Anthracite being scarcely procurable on foreign stations, the comparison is restricted almost entirely to the great classes of coal as they are found in those portions of the United States accessible to Atlantic ports.

The Board submits the following statement under headings numbered, as is believed, in the order of their importance for naval purposes: (1) Heating power, (2) promptness of ignition, (3) weight of a given bulk, (4) procurability, (5) smoke and soot, (6) action upon boilers, grates, etc., (7) impurities, (8) deterioration, (9) friability, (10) completeness of combustion, (11) spontaneous combustion, and (12) price.

(1) *Heating power*.—In reference to this quality the Navy Department was originally induced to employ anthracite, chiefly in consequence of the report of Prof. Walter R. Johnson, of Washington, in 1844, that the evaporative efficiency of average anthracite was superior to that of bituminous coal, the figures being 9.5648 pounds of water evaporated per pound of coal in the former case, and 8.944 in the latter. But the experiments upon which these figures were based were of short duration; many of them occupied less than twenty-four hours, and only two of them lasted more than thirty hours. They, therefore, did not fully include the very important circumstances that anthracite fires need to be cleaned in longer service than about twelve hours, and after that time should be more or less thoroughly cleaned once in every twelve hours. This causes loss of evaporative power in the following ways, to which the fires of free-burning coals are subject in a much less degree: (a) By the direct abstraction of heat from the combustible portion of the fuel to bring the earthy matter and ash to the high furnace temperature; (b) by the direct loss of heat when the clinkers and ashes are withdrawn at that high temperature; (c) by the unavoidable loss of some unconsumed coal during the abstraction of the clinkers; (d) by the influx of cold air through the open furnace door during the operation of cleaning fires; (e) by the loss of heat expended in raising the temperature of air over and above the quantity needed for combustion; (f) by the loss of effect during the time that the fire newly cleaned requires to recover full action. Taking these losses into consideration, it is concluded by the Board that anthracite coal is not, in a long run, the more economical of the two classes, though it may be so in short experiments. But even from Johnson's data, the average evaporative power of the semi-bituminous coals is higher than the average evaporative power of the anthracites, being 9.9804 and 9.5648 pounds of water from 212° F., respectively, and this is the class of coal recommended most highly for naval purposes by the Board. Their conclusion is strengthened by the results of Isherwood's experiments with several marine boilers, some, however, being flue boilers, in which Cumberland semi-bituminous coal generally

evaporated more water than Pennsylvania and other anthracites. And these results are further corroborated by experiments of the Baltimore and Ohio Railroad, quoted by Haswell (p. 569), in which the evaporative effect of 1 ton of Cumberland coal was found to equal that of $1\frac{1}{2}$ ton of anthracite. It is asserted that when combustion is forced, the economic evaporation is relatively less with free-burning coal than with anthracite, but it may be answered that, under the circumstances in which the blast or steam-jet is used, economy is temporarily ignored, the object being to produce active combustion, regardless of cost.

(2) *Promptness of ignition.*—Circumstances have greatly changed since Johnson reported to the Navy Department (p. 597) that this quality was of inferior importance in naval vessels. When it is considered that nowadays one fleet under full steam might be alongside another at anchor in little more than an hour after they sighted each other, it will be seen that, even under heavily-banked fires of anthracite, the fleet at anchor would be at a great disadvantage for manœvering, while with low and dirty fires or with cold boilers, the destruction of that fleet could only be prevented by means extraneous to itself. Promptness of ignition may also be of vital importance on a lee shore, or in a sudden gale in harbor, and under other circumstances. Nor is it in emergencies alone that rapidity of ignition is useful, for it gives much more uniform action in all steaming, since the fires quickly attain their maximum efficiency instead of, as with anthracite, being almost inert for twenty minutes or more after each coaling. In short, the Board is of opinion that this quality is so valuable in a naval vessel that it almost precludes the employment of anthracite in time of war in favor of a more free-burning coal, and that it has considerable advantages also in time of peace.

(3) *Weight of a given bulk.*—In this particular it is generally considered that anthracite shows a marked superiority over the great classes of semi-bituminous and bituminous coals, but the Board is inclined to think that this advantage, if it really exists, has been exaggerated. Indeed, if we consider the experiments of Johnson, the average of all the semi-bituminous coals of Maryland gives rather the smallest space occupied per ton (42.0372 cubic feet), the anthracites ranking second (42.13 cubic feet), the bituminous coals of Pennsylvania being third, but with very trifling difference (42.671 cubic feet), the coking coals of Virginia being the only free-burning varieties which are decidedly lighter (45.8804 cubic feet); and it is only after such modifications as omitting the lightest two anthracites, the heaviest three bituminous coals, etc., that figures are obtained indicating anthracite to be the heaviest class of coal. Even when this is done the semi-bituminous class makes a good comparative showing, the average number of cubic feet to stow the two coals being then 40.845 and 42.0372 for anthracite and semi-bituminous, respectively, or an advantage in favor of anthracite of only 1.1922 cubic foot per ton. Finally, this small advantage is reversed when the quantity of earthy matter in the two coals is considered. Assuming Isherwood's experiments to be more reliable for our present purpose than Johnson's, because more in accordance with the circumstances of ordinary practice in: (a) Rate of combustion; (b) quality of coal tested (these being marketable and not selected for testing by the mining companies); (c) generally greater duration of time, it is found that the anthracites procurable on our Atlantic sea-board contained more earthy matter and ash by 4.3018 per cent. than all other coals tried by him; while we have seen that Johnson's data, even after modification, give the advantage to average anthracite by only 2.8361 per cent., when compared with the semi-bituminous class. In the question of space occu-

pied by combustible, therefore, the Board is of opinion that semi-bituminous coal is better than any other class.

(4) *Procurability*.—In our Atlantic sea-ports it is probable that either anthracite or semi-bituminous coal could be procured in any quantity and with equal facility; but when once our ships leave our eastern coast there are perhaps only one or two ports in the world where anthracite could be obtained at reasonable cost, and at those with no certainty of supply; while even on our Pacific coast they might find it preferable to use the bull eye or other coals of Australia, unless some domestic coal like the Monte Diablo of California, came into more general use. In Europe the very superior Cardiff and other Welsh coals are obtainable almost everywhere, and so are the somewhat inferior Newcastle and other English coals. Varieties of these two classes can also be obtained on the Asiatic and South American stations, though in the former the Australian coals can be procured when they are preferred to the Takasima, Karatz, Formosa, and other domestic coals. There is reason to believe, however, that as the Japanese mines are more deeply worked, the coal will improve in quality. It is certainly better now than it was even ten years ago, and was reported by Chief Engineer Loring, in the Asiatic squadron, to be, generally, the most economical coal procurable in that part of the station.

(5) *Smoke and soot*.—In the non-production of smoke and its importance for concealment in time of war, anthracite coal has always borne the palm. And yet it is a serious question if this quality, valuable only on occasion, is worth the sacrifices made for it. Those naval operations which include surprises are seldom called for, and in these days of swift communication of news would be seldom practicable; furthermore, we are told that the nations which use smoke-producing coal will so time their attacks upon ports and harbors that they will have the whole of the previous night in which to make their approach, and will be at their destination at early dawn; and this is also true of blockade-running. It may be said that when detached single ships or squadrons are in the open, the advantage will lie with those which use anthracite; but this will only be useful when the object is to decline an engagement, for, in approaching to join battle, the moment arrives when concealment of the vessel burning anthracite is no longer possible; then the power of maneuvering or retreating lies, other things being equal, entirely with the ship using the coal of the greatest rapidity of action, and when the prize leaves naught behind but a trail of smoke it will be poor consolation to us to know that we formed none and that our rigging is unsoiled. Besides which, if we used smoke-producing coal we would at least be no worse off than the navies of other great nations of the world; the more vigilant combatant will first catch sight of the enemy, and the coal of quicker action will put him the sooner alongside. If, however, the suggestion of the Board be feasible and be acted upon, to procure, as may be possible, a smokeless free-burning coal, the advantage of anthracite in this respect will altogether vanish; and in this connection it may be stated that some of the Cumberland coal forms only a light brown, transparent smoke, and that we might expect to find some analogue of certain Welsh coals which are almost absolutely smokeless.

There is, undoubtedly, a freedom from soot in the use of anthracite coal, but while this is an advantage over the true bituminous varieties, it is not so marked in the case of the semi-bituminous classes; and even in the former case there are some bituminous coals which in their use necessitate sweeping the flues regularly in a voyage, and which may yet give a good, economical performance when compared with anthracite,

since the losses caused by opening the uptake doors in the one case may be counterbalanced by those attending the opening of the furnace doors while cleaning fires in the other case.

(6) *Action upon boilers, grates, etc.*—In this respect it is likely that there is not much to choose between the anthracites and free-burning coals, at least with iron boilers; for, whereas the intense local heat of an anthracite fire searches and develops any tendency toward blistering or lamination in boiler-iron, there are several varieties of free-burning coal which contain sulphur, and which are injurious on that account to tube-ends, etc. Both classes will, under certain circumstances, warp and destroy grate-bars. This may be a suitable place in which to refer to the question of alterations called for in boilers, grates, etc. The Board is of the opinion that no radical change will be necessary even if its recommendations be adopted. The diameter of tubes in our boilers has of late years been slightly increased, which is a step favorable to the use of free-burning coal, though it is possible that a slightly further increase in this direction might be advisable in new boilers; while the distance apart of the grate-bars can be sufficiently regulated by the engineer force on board to suit the requirements of each case.

(7) *Impurities.*—Little perhaps remains to be said under this head, since the evil consequences of the presence of those impurities which form clinker and ash have been touched upon in sections 1 and 3, and the injurious effect of sulphur upon boilers has been alluded to in section 6. But the mention of sulphur leads to the consideration that semi-bituminous coal, if selected for use in the Navy, should be as free as possible from sulphur and phosphorus, because while the generality of blacksmiths away from the interior of Pennsylvania allege the impossibility of doing efficient forge-work with anthracite coal (and it may be said in passing that this necessitates the storage on board our vessels of a small quantity of "soft coal" for blacksmithing, a minor disadvantage attending the use of anthracite in the Navy), the coal for such purposes must be free from matters which would interfere with efficient welding, etc. Moreover, if spontaneous combustion is feared (a subject which is more fully treated of in section 11), the coal should be free from pyrites.

(8.) *Deterioration.*—It is probably true that anthracite will scarcely deteriorate in heat-giving power except after long exposure to the direct action of the sun, as in the coal piled on the sandy beach at St. Paul de Loando from about 1862 to 1882; for the similar coal at Fernando Po, having been overgrown with weeds and trees, and therefore sheltered from the rays of the sun, was almost as efficient after twenty years as when it was fresh. The free-burning coals, on the other hand, rapidly lose their cohesion and heat-giving power. In the closed bunkers of a ship, however, except perhaps in the immediate vicinity of boilers, this deterioration proceeds much more slowly, and if the coal was of good quality and freshly mined in the first place, it is not likely that its efficiency would be materially lessened, even in the course of a cruise. Still, it might be expected that anthracite under similar favorable circumstances would last as long as the ship; indeed, almost indefinitely.

(9) *Friability.*—Here again the anthracite coals, owing to their superior cohesion, will last much longer in the lumpy state, and will much better endure transfer from the mine to the port, and the subsequent handling till they are in the ship's bunkers, though this very cohesive power entails positive labor in breaking up the lumps on the fire room floor to the size necessary for the most efficient combustion. If, however, the friability has resulted in both cases in the production of slack, there is no comparison between the two classes of coal, for the dust of anthracite is absolutely worthless on the grates of a boiler, whereas the

slack of the free-burning coals, as long as it is not too old, is not only tolerably efficient in the formation of steam, but from its caking qualities is often preferred for blacksmiths' purposes.

(10) *Completeness of combustion*.—This is a quality of greater importance than might at first be supposed, and is an advantage possessed to a greater degree in most of the semi-bituminous coals than in most of the anthracites. Besides the wastefulness caused in the furnace by the greater average formation of clinker with the latter coal, there is the greater labor necessary and time lost in their removal from the boiler, and their being disposed of overboard. While the severe labor called for in cleaning fires would be mitigated by the use of free-burning coal, and the work of breaking the lumps will almost entirely cease, these differences may not admit of fewer men being employed, though they would less severely tax the firemen.

(11) *Spontaneous combustion*.—Anthracite coal is probably entirely free from this source of danger, which, however, possesses few terrors now. The proper selection of dry coal free from pyrites, and its stowage away from bunkers directly over boilers, will probably prevent this action entirely. The fitting of water pipes in the bunkers leading to the deck and capable of being tried by a thermometer would give timely notice if it should begin, while the more powerful pumps and the iron hulls of the present day would relieve seafaring men from the anxiety caused by this once mysterious process, if it should continue.

(12) *Price*.—In this respect there is no comparison between the two classes of coal on foreign stations; for, as has been already observed, away from the Atlantic coast of the United States there are only one or two ports in the world where anthracite can be reasonably looked for, while elsewhere it could hardly be obtained in sufficient quantities at any price unless stored expressly for our ships; in which case freights and probable rentage would raise the price. Its retention would be only by the favor of the nation in whose territory it was stored, while in the event of war with that power its loss would be almost inevitable. And in the Atlantic ports it is likely that semi-bituminous coal would be procured in quite as large quantities and at quite as low prices as anthracite.

From the abundant record of experiment available the Board has compiled the accompanying table, exhibiting the data from which the qualities of the coals are inferred. The evaporative values are represented by the proportion of combustible (or gasifiable) matter contained in the coals and the quantity of water evaporated, the former being stated in per centum of the whole weight of the crude coal, the latter in the absolute weight of water evaporated from a temperature of 212° F., under atmospheric pressure, by the combustion of one pound of crude coal.

With regard to other considerations which may determine the choice of coals for use in the naval service, the Board has found them well set forth in Professor Johnson's report already alluded to; in Main and Brown on the steam engine; in a report to the Bureau of Steam Engineering of a board of naval engineers, under date of October 24, 1878; in the report of Chief Engineer Loring, mentioned above, and in several writings of Chief Engineer Isherwood.

It may be seen that while the Board, in the main, agrees with the authors of these valuable documents in their conclusions, it differs with them in the relative importance to be attached in the naval service to certain qualities in coal, and disagrees in toto with those deductions of Professor Johnson, made forty years ago, which resulted in the selection of anthracite to the exclusion of other fuel, the Board recommending, for the reasons stated above, a good quality, smokeless if procurable, of semi-bituminous coal.

122 ANTHRACITE AND BITUMINOUS COAL FOR NAVAL USE.

No. for reference.	Market designation of coal.		Where mined.		Description of coal.	Sources of information.	Combustible in coal.	Water evaporated per pound of coal.
	State.	County or locality.						
1	Beaver Meadow, Slope No. 3	Pennsylvania	Carbon	Anthracite	Report to Navy Department, Walter K. Johnson, 1844.	Per cent. 86.042	Pounds. 9.2073	
2	Beaver Meadow, Slope No. 5	do	do	do	do	93.2550	9.8788	
3	Beaver Meadow	do	do	do	do	91.8963	9.0791	
4	Forest Improvement	do	Schuylkill	do	do	93.0298	10.0576	
5	Peach Mountain	do	do	do	do	93.1450	10.1118	
6	Lehigh	do	do	do	do	92.7765	8.9920	
7	Lackawanna	do	Luzerne	do	do	91.0723	9.7888	
8	Lykens Valley	do	Dauphin	do	do	87.7650	9.4628	
9	Lehigh	do	Lehigh	do	Experimental Researches, Isherwood, Vol. I, 1863.	81.4700	8.2500	
10	Blackheath	do	Schuylkill	do	do	87.7400	11.2657	
11	Harvey's Mine	do	do	do	do	88.6300	9.9770	
12	Lackawanna	do	Luzerne	do	do	82.7100	9.1395	
13	Scranton	do	do	do	do	82.7500	8.3790	
14	Boston	do	do	do	do	79.0500	8.8020	
15	Hazleton	do	do	do	do	84.9700	8.8680	
16	Pitston	do	do	do	do	82.5500	9.6280	
17	Cornell Ridge	do	do	do	do	89.2000	8.6280	
18	Spring Mountain	do	do	do	do	86.2400	9.1760	
19	Locust Mountain	do	Schuylkill	do	do	80.2900	8.6850	
20	Unknown	do	do	do	do	85.8400	8.7880	
21	Broad Mountain	do	do	do	do	80.6400	8.2290	
22	Blackheath	do	do	do	do	82.7100	9.3320	
23	Unknown	do	do	do	do	83.0000	9.3630	
24	do	do	Susquehanna Valley	do	Experimental Researches, Isherwood, Vol. II, 1865.	88.9000	7.6300	
25	do	do	do	do	Board of Naval Engineers, March and April, 1873.	89.5100	10.2700	
26	do	do	Northeast Portion	do	Board of Naval Engineers, Report October 24, 1878.	84.8000	9.9923	
27	Wilkesbarre, Black Diamond	do	Northumberland	do	Report Quartermaster-General, U. S. Army, January 31, 1882.	80.7700	9.3700	
28	Scranton, Delaware and Hudson Canal Company.	do	Luzerne	do	do	77.3000	9.2800	
29	Lykens Valley	do	Dauphin	do	do	83.9700	7.8400	
30	Forest Improvement	do	Schuylkill	do	do	79.4300	8.2400	

31	Pittston Pennsylvania Coal Company.	do	Luzerne	do	do	83,2500	9,8200
32	Blackheath	do	Schuylkill	do	do	80,2000	9,8400
33	Wilkesbarre, Prospect Mine.	do	do	do	do	85,0000	9,7700
34	Lackawanna, White Ash.	do	do	do	do	83,3400	9,7500
35	Lykens Valley, Red Ash.	do	Dauphin	do	do	85,7600	9,7200
36	White Ash, Lee.	do	Wyoming	do	do	90,7200	9,6300
37	White Ash, Shenandoah, Middle Coal Fields.	do	Schuylkill	do	do	84,5000	9,5500
38	Pittston, Butler Colliery	do	do	do	do	81,0000	9,5100
39	Hard White Ash, Baltimore Vein, Lee Mines.	do	Northumberland	do	do	81,8300	9,4100
40	Red Ash, Lorcherry	do	Schuylkill	do	do	84,8000	9,3400
41	Lehigh Valley, Old Lee Mine.	do	do	do	do	83,6300	9,0400
42	Raven Run Mine	do	do	do	do	84,7400	9,0400
43	Lykens Valley, Red Ash	do	Dauphin	do	do	83,1100	9,0000
44	Glen Carbon	do	Western Portion Middle Coal Fields.	do	Semi-anthracite.	82,34	9,2080
45	Ormsby	do	Mercer	do	do	84,31	9,0852
46	Brookfield	do	do	do	do	93,17	8,2970
47	New York and Maryland Mining Company.	Maryland	Alleghany	do	Semi-bituminous	87,2915	9,7774
48	Frostburg, Neff's Mine	do	do	do	do	88,0440	9,4410
49	Eashy's "Coal-in-store"	do	do	do	do	91,6154	10,0183
50	Atkinson and Templeman's	do	do	do	do	92,1685	10,6991
51	Eashy and Smith's	do	do	do	do	90,3136	9,9654
52	Broadtop	Pennsylvania	Huntington	do	do	89,9100	10,4025
53	Cumberland, George's Creek	Maryland	Alleghany	do	do	86,8100	10,7380
54	Cumberland	do	do	do	do	91,6100	10,2850
55	do	do	do	do	do	87,6200	10,6430
56	Broadtop	Pennsylvania	Huntington	do	do	86,1200	8,9940
57	Cumberland	Maryland	Alleghany	do	do	90,4500	8,7260
58	Frostburg	do	do	do	do	87,7000	9,9857
59	Standard Coal Company, Brother's Valley.	Pennsylvania	Somerset	do	do	88,9900	9,8500
60	Philson Iron and Coal Company, Berlin.	do	do	do	do	90,9200	9,7500
61	Cumberland	Maryland	Alleghany	do	do	86,6700	10,0200
62	Dauphin and Susquehanna Company.	Pennsylvania	Dauphin	do	Bituminous	83,6370	9,3428
63	Blossburg	do	Tioga	do	do	88,7961	8,6401
64	Lycorning Creek	do	Lycorning	do	do	83,0900	8,9107
65	Quinn's Run	do	Clatsop	do	do	91,1145	10,2720
66	Carbarns	do	Cleatfield	do	do	92,1061	8,0912
67	Cambridge Company	do	Cambridge	do	do	90,2476	9,2404
68	Frisburgh	do	Alleghany	do	do	91,7470	8,2044
69	Newcastle	England	Northumberland	do	do	94,3205	8,6558

No. for reference.	Where mined.		Description of coal.	Sources of information.	Combustible in coal.	Water evaporated per pound of coal.
	State.	County or locality.				
70	Pennsylvania	Clinton	Bituminous	Experimental Researches, Isherwood, Vol. I, 1863.	Per cent. 86.9700	Pounds 9.3070
71	Virginia	Fayette	do	Beard of Naval Engineers, Report October 24, 1878.	93.6000	10.2023
72	do	Henrico (?)	Bituminous coking	Report to Navy Department, Walter K. Johnson, 1844.	83.9264	9.0182
73	do	do	do	do	85.6595	8.3448
74	do	Powhatan	do	do	89.2980	8.5842
75	do	do	do	do	85.1730	8.2933
76	do	do	do	do	89.7417	8.7506
77	do	do	do	do	89.7248	8.9441
78	do	Chesterfield	do	do	91.3594	8.4168
79	do	do	do	do	89.3901	7.6755
80	do	Dunwiddie	do	do	90.9313	8.9933
81	do	Perry	do	do	90.2767	7.7455
82	Indiana.	Various	Cannel	do	94.5746	7.3409
83	Wales	Various	Bituminous and semi-bituminous.	Report on coals, De la Beche and Playfair.	.....	9.0500
84	England	Northumberland	Bituminous	Main and Brown.	.....	8.3700
85	.....	.....	Patent bituminous.	.....	.....	9.1633

Market designation of coal.

Where mined.

State.

County or locality.

Description of coal.

Sources of information.

Combustible in coal.

Water evaporated per pound of coal.

ANALYSES OF COAL.

The following analyses of Pennsylvania anthracite were made in 1884 by Mr. C. H. Ashburner:

Number of specimens.	Name of coal-bed.	Name of coal-field.	Chemical analysis.					Specific gravity.	Percentages of constituents of fuel.		
			Water.	Volatile matter.	Fixed carbon.	Sulphur.	Ash.		Fixed carbon.	Volatile combustible matter.	Fuel ratio.
3	Wharton	Eastern Middle (Lehigh).	3.713	3.080	86.404	.585	6.218	1.620	96.56	3.44	28.07
5	Mammoth	do	4.119	3.084	86.379	.496	5.922	1.617	96.55	3.45	27.99
2	Primrose	Western Middle (Shenandoah).	3.541	3.716	81.590	.499	10.654	1.654	95.64	4.36	21.93
5	Mammoth	do	3.163	3.717	81.143	.899	11.078	1.657	95.62	4.38	21.83
2	Primrose? (F)...	Southern (Manch Chunk).	3.008	4.125	87.982	.506	4.379	1.584	95.52	4.48	21.32
2	Back Mountain ..	Western Middle (Shenandoah).	3.042	3.949	82.662	.462	9.885	1.667	95.44	4.56	20.93
1	Seven-foot	do	3.410	3.978	80.868	.512	11.232	1.651	95.31	4.69	20.32
7	Mammoth	Southern (Manch Chunk).	3.087	4.275	83.813	.641	8.184	1.631	95.15	4.85	19.62
3	do	Northern (Wilkesbarre).	3.421	4.381	83.268	.727	8.203	1.575	95.00	5.00	19.00

These analyses are arranged in the order of the percentage of fixed carbon in the fuel constituents.

Average composition of bituminous coals and of anthracite.

Coal.	Specific gravity.	Carbon.	Hydrogen.	Nitrogen.	Sulphur.	Oxygen.	Ash.	Percentage of coke.
Welsh	1.32	83.78	4.79	.98	1.43	4.15	4.91	72.6
Duffryn	1.33	88.26	4.66	1.45	1.77	.6	3.26	84.3
Newcastle	1.26	82.24	5.42	1.61	1.35	6.44	2.94	60.67
Scotch	1.26	78.53	5.61	1	1.11	9.69	4.03	54.22
Derbyshire	1.29	79.85	4.84	1.23	.72	10.96	2.4	59.32
Lancashire	1.28	78	5.82	1.32	1	8.75	5.69	60.22
Sydney, S. W. ....	.....	82.39	5.32	1.27	.07	8.32	2.04	58.00
Borneo	1.28	64.52	4.74	.8	1.45	20.75	7.74	.....
Formosa Island ..	1.24	78.26	5.70	.64	.49	10.95	3.96	.....
Vancouver's Island.	.....	66.93	5.32	1.02	2.2	8.7	15.83	.....
Chili, Conception Bay.	1.29	70.55	5.76	.95	1.98	13.24	7.52	.....
Chili, Chiriqui ..	.....	38.98	4.01	.58	6.14	13.38	36.91	.....
Patagonia .....	.....	62.25	5.05	.63	1.13	17.54	13.4	.....
Van Dieman's Land:	.....	.....	.....	.....	.....	.....	.....	.....
South Cape .....	.....	63.40	2.89	1.27	.98	1.01	30.45	.....
Adventure Bay ..	.....	80.22	3.05	1.36	1.9	4.8	8.67	.....
Cannel, Wigan	1.23	79.23	6.08	1.18	1.43	7.24	4.84	60.33
Cumberland .....	.....	93.81	1.82	.....	.....	2.77	1.6	.....
Anthracite	1.50	88.54	.....	.....	.52	.....	8.67	.....
Patent, Warlich's ..	1.15	90.62	5.56	.....	1.62	.....	12.91	85.1
Patent, Wylam's ..	1.10	79.91	5.69	1.68	1.25	6.63	4.84	65.8

* An analysis by Messrs. Pattinson and Sneed (1887) gives C, 88.40; H, 3.65; N, 0.64; S, 0.76; O, 2.55; ash, 3.17; water, 0.83.

† Including oxygen.

ANALYSES OF COAL—Continued.

NEW SOUTH WALES.

I.—NORTHERN DISTRICT.

	Specific gravity.	Composition, per cent., exclusive of water.						Water, per cent.	Coke, per cent.
		Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Sulphur.	Ash.		
Wallsend	1.333	79.96	6.26	7.08	0.68	1.25	4.77	2.75	61.86
Waratah	1.303	81.06	5.81	6.52	1.23	1.14	4.24	2.21	59.97
Australian Agricultural Company, Newcastle	1.297	78.70	6.34	7.28	0.79	1.36	5.47	2.20	62.87
Greta	1.287	78.41	6.60	9.34	1.43	1.44	2.78	2.25	57.13
Russell's mine	1.274	77.37	6.48	10.46	1.51	1.43	2.75	1.85	52.65
Anvil Creek	1.323	77.15	5.91	6.07	1.46	1.48	7.93	1.74	55.70
Cardiff mine	1.286	82.25	4.38	6.95	1.03	0.35	5.04	1.85	54.43

II.—WESTERN DISTRICT.

Eskbank	1.335	72.30	5.43	6.65	0.85	1.60	13.17	2.00	62.88
Bowenfels	1.399	70.72	5.65	9.65	0.93	1.38	11.67	2.36	.....
Lithgow Valley	1.329	69.41	6.10	11.70	1.03	1.44	10.32	1.95	62.46
Vale of Clwydd	1.323	69.86	5.82	11.89	1.02	1.40	10.01	2.10	63.18

III.—SOUTHERN DISTRICT.

Nattai .....	.....	91.24	3.60	0.59	.....	Trace.	4.56	3.28	92.37
Mount Kembla	1.363	80.67	5.30	1.58	0.70	0.87	10.88	1.50	.....
Mount Keira	1.379	78.82	5.17	3.87	1.33	1.00	9.81	1.15	74.35
Berrima	1.364	69.92	4.55	13.09	0.56	1.30	10.58	1.70	64.24
Bulli (R. Smith)	1.471	76.35	4.75	5.04	.....	0.55	13.31	1.03	74.78

These coals are free-burning bituminous. Those from the northern district are, as a class, superior to those from the southern, which in turn are better than the western. The northern are brighter and more laminated in appearance than the southern, contain a larger proportion of volatile hydrocarbons, coke more readily, and give off much more smoke. They are shipped from Newcastle and Sydney. Those from the southern district are shipped from Coal Cliff, Bulli, and Wollongong. Those from the western district are only partially developed, are very dry, and of a dull appearance, and only coke when freshly mined.

NEW ZEALAND.

Locality and description.		Fixed carbon.	Hydro-carbons.	Water.	Ash.	Evaporative power.*
Auckland:						
Kama mine, Whangarei, pitch		50.01	37.69	9.61	2.69	6.50
Walton's mine, Whangarei, pitch		38.80	41.20	7.20	12.80	4.96
Whangarei, glance		50.11	38.68	8.01	3.20	6.50
Waikato, brown		50.01	29.97	19.52	2.20	6.59
Okoko, Waipa, brown		39.83	33.74	22.21	4.22	5.17
Canterbury:						
Acheron, anthracite		84.12	2.06	1.80	12.12	10.93
Malvern, brown		49.99	35.42	11.79	2.80	6.49
Malvern Hills, altered brown		53.29	32.04	12.05	2.02	6.92
Do		68.54	19.89	4.15	7.42	8.87
Rakaia Gorge, brown		50.12	21.61	24.09	4.18	6.50
Rakaia Gorge, glance		64.51	21.27	6.76	7.46	8.30
Homebush Colliery, Malvern, brown		47.70	30.00	19.20	2.20	6.20

* By Thompson's calorimeter.

ANALYSES OF COAL—Continued.

NEW ZEALAND—Continued.

Locality and description.	Fixed carbon.	Hydro-carbon.	Water.	Ash.	Evaporative power.*
Colliogwood, bituminous.....	44.03	22.34	3.61	30.02	5.72
Do.....	50.78	40.41	3.60	5.21	6.60
Otago:					
Kaitangata Creek, brown.....	44.11	32.32	15.44	2.13	5.74
Do.....	39.41	37.25	19.61	3.73	5.12
Shag Point, brown.....	45.30	30.10	19.20	5.40	5.66
Otamataura Creek, bituminous.....	52.89	36.63	2.19	8.29	7.90
Preservation Inlet, bituminous.....	60.88	20.09	4.33	6.19	7.91
Reefton:					
New Durham mine, bituminous.....	54.09	37.64	4.36	3.91	7.00
New Durham mine, brown.....	48.02	35.57	14.21	2.20	6.20
Lankey's Creek, altered.....	58.01	33.29	6.79	2.01	7.50
Murray's Creek, bituminous.....	53.96	35.87	8.18	1.99	7.00
Dudley mine, brown.....	48.10	35.88	14.21	1.81	6.20
Springfield Colliery, brown.....	38.00	31.50	18.60	11.90	4.90
Westland:					
Grey River, pitch.....	34.80	55.40	6.20	2.63	4.50
Grey River, bituminous.....	62.37	20.44	1.99	6.20	8.01
Black Creek, Grey River, pitch.....	60.20	29.97	2.01	1.82	7.82
Kanieri, bituminous.....	64.82	24.17	3.81	7.20	8.40
Do.....	52.38	43.44	1.39	2.79	6.80
South of Ross, bituminous.....	42.53	31.43	6.58	19.46	4.10
Westport:					
Brown.....	56.01	37.17	2.60	4.22	7.28
Mokihini, bituminous.....	55.59	38.86	3.16	2.39	7.20
Do.....	59.75	32.14	3.97	4.14	7.76
Do.....	57.92	34.94	3.96	3.18	7.50
Brunner mine, bituminous.....	56.62	35.68	1.59	6.11	7.36
Near Cape Farewell, bituminous.....	48.59	43.17	2.18	6.06	6.63

BRITISH COLUMBIA.

	Fixed carbon.	Volatile combustible matter.	Ash.	Hygroscopic water.	Sulphur.
Baynes Sound mine.....	64.70	29.55	5.75	.....	.....
Union mine, Comox.....	68.27	27.17	2.86	2.86	.....
Wellington,† Departure Bay.....	59.72	30.95	6.58	2.75	.....
Nanaimo;.....	51.45	34.00	10.50	.....	.....

NOVA SCOTIA.

Springfield mines.....	60.83	34.38	3.78	1.02	.....
Albion mines, Pictou County.....	66.50	24.28	7.74	1.48	.....
Acadia mines, Pictou County.....	57.57	32.27	7.56	2.10	0.50
Sydney mines, Cape Breton.....	61.50	31.14	4.32	3.04	.....
Gowrie mines, Cape Breton.....	63.00	30.64	3.50	.....	2.86

INDIA.

Karharbari.....	66.85	24.00	9.13	.....	.....
Umaria.....	63.03	29.25	7.68	.....	.....
Raniganj.....	63.30	27.50	9.20	.....	.....
Makum.....	60.30	35.90	3.80	.....	.....
Garh Hille.....	51.80	45.60	2.60	.....	.....

* By Thompson's calorimeter.

† For evaporative test, see page 139.

* For another analysis of this coal, see page 130, table under "Coal in Alaska."

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ANALYSES OF COAL—Continued.

CHINA.

[Analysis by Mr. J. C. F. Randolph.]

	Fixed carbon.	Volatile combustible matter.	Ash.	Specific gravity.	Remarks.
Yangtse-Kiang River:					
Mun-to-san.....	71.0	19.0	10.0	1.71	Very soft; much slack.
See-mah-poo.....	80.0	11.0	9.0	1.74	Very soft; black.
Woo-sheu-tung.....	47.5	13.0	39.5	1.78	Very soft and slaty.
Chin-san.....	73.0	13.0	14.0	1.72	Hard.
Tse-lung-chung.....	73.3	13.5	13.2	1.70	Surface coal soft and earthy.
Kun-chok-wan.....	72.5	16.5	11.0	1.71	Hard.
Ho-peck-tsung-ho.....	63.8	28.0	8.2	.....	Used by steamers on Yangtse.
Tenug-ho.....	74.0	9.0	17.0	.....	.....
Hoo-nan.....	84.2	10.8	5.0	.....	Hard black anthracite.
Han-kow.....	84.0	11.0	5.0	.....	Anthracite.

Nos. 1, 2, 3, 4, 5, and 6 are semi-anthracites; No. 7 yields about 72 per cent. of good coke.

Weights, evaporative powers per weight and bulk, etc., of coals.

[W. R. Johnson and others.]

Coals.	Specific gravity.	Weight per cubic foot.	Steam from water at 212° by 1 pound of fuel.	Clinkers from 100 pounds.	Space required to stow a ton.
BITUMINOUS.					
Cumberland:		<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Cubic feet.</i>
Maximum.....	1.313	52.92	10.70	2.13	42.30
Minimum.....	1.337	54.29	9.44	4.53	41.20
Duffryn.....	1.326	53.22	10.14	.....	42.09
Cannel Wigan.....	1.230	48.30	7.70	.....	46.37
Blossburgh.....	1.324	53.05	9.72	3.40	42.20
Midlothian:					
Screened.....	1.283	45.72	8.94	3.33	49.00
Average.....	1.294	54.04	8.29	8.82	41.46
Newcastle, Hartley.....	1.257	50.82	8.66	3.14	44.00
Pictou.....	1.318	49.25	8.41	6.13	45.00
Pittsburgh.....	1.252	46.81	8.20	.94	47.80
Sydney.....	1.338	47.44	7.99	2.25	47.20
Carr's Hartley.....	1.262	47.88	7.84	1.86	46.70
Clover Hill, Va.....	1.285	45.49	7.67	3.86	49.20
Cannelton, Ind.....	1.273	47.65	7.34	1.64	47.00
Scotch, Dalkeith.....	1.519	51.09	7.08	5.63	43.80
Chili.....	.....	.....	5.72	.....	.....
Japanese, Takasima.....	1.231	48.30	.....	.....	.....
ANTHRACITE.					
Peach Mountain.....	1.464	53.79	10.11	3.03	41.6
Forest Improvement.....	1.477	53.66	10.06	.81	41.7
Beaver Meadow, No. 5.....	1.554	56.19	9.88	.60	39.8
Lackawanna.....	1.421	48.89	9.79	1.24	45.8
Weleh, Jones & Co.....	1.375	58.25	9.46	.....	33.45
Beaver Meadow, No. 3.....	1.610	54.93	9.21	1.61	40.7
Lehigh.....	1.590	65.32	8.93	1.08	40.5
Patent, Warlick's.....	1.150	69.05	10.36	.....	32.44

COAL IN ALASKA.

[Extract from Dall's "Alaska and its Resources," (1869).]

Page 473. "The following is a list of the known localities of coal up to the date of writing:

"Port Gardner, Hood's Bay, Admiralty Island (good bituminous, used by the Saginaw in 1868); Hamilton Harbor, on the east side of Kake Strait (a vein of good bituminous coal opened in July, 1868); Kruznoff Bay, Admiralty Island; Kuin Island; Kuprianoff Island; Port Camden, Kake Strait (a 6 inch vein reported in hard rock, with a southerly dip of 35°); St. John's Bay, Baranoff Island (fragments in débris of a glacier; recent reports state that the vein has been discovered, and the coal successfully used in a United States steamer); Coal Harbor, Unga Island (examined by Dall in 1865); coal poor quality, in thin veins, much mixed with slate and silicified wood, quite valueless; southwest of Aliaska (black lignites, Ermon); Cape Beaufort, Arctic coast (a small vein of true Carboniferous coal); Abkun (coal said to occur by Lütke); Unalaska, near Captain's Harbor (small lignite veins according to Vernaminoff); Atka (lignite of poor quality found near Sand Bay); Amchitka (lignite); Wrangell Harbor (coal reported of good quality by General Halleck); and, finally, Cook's Inlet. In the latter locality are found two most promising deposits.

"North of Cape Harichkoff the coal is found in two parallel layers; they are variously reported from 18 inches to 7 feet in thickness, and are found from 36 to 60 feet below the top of the bank. Farther to the north a third layer appears. They continue nearly to Cape Nenelchek with a north-northeast dip, and appear again on the north side of the cape, and then continue, first with a south-southeast dip, and afterwards horizontally to the mouth of a small stream. The coal is Tertiary, and, like most Tertiary coals, is inferior to the Carboniferous coals, both in quality and thickness of seams."

* * * * *

Page 475. "Anthracite coal has been several times reported from various ports of Alaska. It is probable that the specimens collected may owe their quality to the local metamorphism of the rocks by heat rather than to the general character of any large deposit. * * * Commercially speaking, a vein of coal less than 3 feet thick (of clear coal) is of very little value, except for local use." * * *

The annexed table will show at a glance the comparative value and composition of the coals of the different formations on the west coast of America, and the best Carboniferous coals of Pennsylvania and England. It shows superiority of Cook's Inlet coal, not only over all the Miocene coals, but also over all the Cretaceous coals of the Pacific Slope.*

* The analysis of the Alaska coal was due to Prof. J. S. Newberry, of the School of Mines, Columbia College, New York, and State geologist. He says: "This coal is fully equal to any found on the west coast, not excepting that of Vancouver's Island and Bellingham Bay."

Formations.	Moisture.	Fixed car- bon.	Volatile combustible matter.	Ash.	Sulphur.	Variety.
Carboniferous:						
Pittsburgh, Pa.	2.34	55.82	34.31	7.16	?	Bituminous.
Ormsby, Pa.	4.00	66.56	26.93	2.50	?	Do.
Kentucky	2.00	56.01	37.89	4.10	.....	Canuel.
Lehigh, Pa.	2.34	88.05	2.94	6.66	.....	Anthracite.
Newcastle, England	0.99	61.70	33.55	3.75	0.23	Bituminous.
Cretaceous:						
Nanaimo, Vancouver's Island.	2.98	46.31	32.16	18.55	?	Lignitic.
Bellingham Bay	8.39	45.69	33.26	12.66	.....	Do.
Mount Diablo, California (best black diamond).	14.69	46.84	33.89	4.58	.....	Do.
Miocene:						
Coos Bay, Oregon.	20.09	41.98	32.59	5.34	?	Do.
Carbor Station, Pacific Railroad	11.60	57.67	27.68	6.17	2.90	Do.
Week's River, Pacific Railroad	9.45	26.21	58.32	3.64	2.40	Do.
Cook's Inlet	1.25	49.89	39.87	7.82	1.20	Do.

[Extract from "Report upon the Customs Districts, Public Service, and Resources of Alaska Territory," by William Gouverneur Morris, Special Agent Treasury Department, 1879, p. 103.]

Alaska is full of coal. It can be found cropping out all along the coast, islands, and interior. Professor Blake is authority for the following, taken from his report upon the mineral resources of the Territory in 1868:

"Coal beds have been worked by the Russians at several points, but chiefly at Kenai on Cook's Inlet. The quality, however, is not equal to that of Nanaimo on Vancouver's Island, to the southward. It is here important to note that many islands along the northwest coast from Vancouver's northward are not formed of volcanic rocks as generally supposed, and stated by some writers, but they consist of stratified formations, chiefly sandstones and shells, which are favorable to the existence of coal beds, indications of which have been found at various points. It is probable that the formations of Baranoff on Sitka Island and Prince of Wales Island—indeed, of all the islands of that extensive archipelago, are equivalents in age of coal-bearing strata of Vancouver's and Queen Charlotte Islands. On the latter the existence of beds of a very superior quality of anthracite has lately been made known, and samples of it have been tested at San Francisco with satisfactory results. The extent and value of these beds have not been ascertained, but their existence is a most significant fact, and suggests that a continuation of them may be found in a prolongation of the same formation in the islands to the northward within the limits of the recently acquired territory. The points at which I made an examination of the stratified rock formations were at Sitka and the adjoining islands, and at the mouth of the Stickeen River. At these places they consist of sandstones and shales regularly stratified, and passing in some places into hard slate, which project along the shores in thin knife-like reefs.

"Coal has been noted upon the island of Ounga, on the west side of Iakharooskai Bay, in two places. The beds are horizontal, and are probably lignite. Vancouver noted coal on Cook's Inlet. The miners who worked for gold upon the upper part of the Stickeen River in 1862 and 1863 reported coal as existing there. Coal of superior quality in broken and drifted specimens has recently been found by my brother, Mr. Theodore A. Blake, geologist of the Alaska expedition of 1867,

along the course of a small stream which empties into St. John's Bay, north of Sitka. The beds could not be found, and their extent is consequently unknown.'

"Captain White, U. S. R. M., says:

"I have seen coal veins over an area of 40 or 50 miles, so thick that it seemed one vast bed. It has excellent steam quality; leaves a clear, white ash. It comes out in cube blocks, bright and clean; it does not cake; the quantity seems to be unlimited. This bed lies northwest of Sitka, up Cook's Inlet or Bay, which extends to nearly 61° N., and broadens into a sea in some parts.'

"Morris says: 'I had some specimens of coal taken from Admiralty Island submitted to me at Wrangell, and gave them to the acting chief engineer of the *Walcott* (revenue cutter), to be tested. He said, as a result of trial: "Coal, bituminous; free burning; comparatively little smoke; intense bright, white heat, and retaining its form similar to English cannel. Judge it valuable as grate and steaming coal."

"I am credibly informed that immensely valuable coal deposits exist on Kon Island, in the Alexander Archipelago.

"Back of Sitka, at Kake and Kaatzao, are coal mines, no one knows how extensive. At Jarkow and Chitkat the coal crops out in abundance, and to the westward of Sitka it is the testimony of all the traders that coal can be found almost at any place one chooses to land.'" (The latter is on the authority of Major Dodge, Sitka.)

[Extract from *Alaska Coast Pilot*, 1869.]

"Eighty miles distant from Victoria, on the eastern side of Vancouver's Island, extensive deposits of coal occur, known as the Nanaimo mines. These mines were opened in the year 1852 by the Hudson Bay Company, but have since passed into the hands of other parties.

"The total shipment of coal from the year 1852 to 1869 probably exceed 200,000 tons. The shipments for the year 1864 were 29,042 tons. The coal is highly bituminous, well suited for household use and steaming purposes. The beds are known to belong to the Cretaceous period, and are much upheaved and vaulted, rendering their operation difficult and expensive.

"The coal is furnished on the wharf at Nanaimo at \$6 (gold) per ton.

"In 1868 a mine of the best bituminous coal yet found on our Pacific coast was opened by the United States steamer *Saginaw* at Mud Bay, Admiralty Island."

[Cruise of the *Corwin*, Captain Hooper, U. S. R. M., 1881(?).]

"About 8 a. m. we anchored off a coal mine, which, upon examination, was found to consist of several veins, varying in thickness from 1 to 4 feet, lying in a north-northwest and south-southeast direction, and dipping to the south-southwest at an angle of 45°. Six of these veins were found. * * * We experienced some difficulty at first, owing to the ice and snow and a lack of proper appliances for mining, and later in the season on account of the surf on the beach. However, we succeeded at this time in getting about 6 tons, and found it to be of fair quality, very similar to the coal of Seattle, Wash. It burns freely, making very little smoke, but a large amount of ashes; it burns well in the stove. The location of the vein is latitude 68° 50' N., longitude 164° 55' W. * * * There is good anchorage with a southerly wind, within half mile of shore, in 4 fathoms of water, and fair holding-ground. It is well marked by a peculiar headland,

which terminates seaward in a perpendicular cliff of sandstone and shale some 400 feet high. The veins of coal on the face of the cliff can be seen distinctly at a distance of 1 mile. About 8 miles east of this, at Cape Beaufort, is a small vein of coal, etc.

"Our supply of coal being low, and there being but 25 tons at St. Michael's, with the season's work only half completed, it was decided to return to Plover Bay and fill bunkers from the coal stored there by the Russian Government. * * * Determined to get sufficient coal from the mine previously mentioned to enable us to make one more effort to reach Herald Island before going to Plover Island to fire up.

"*Mining coal for the Corwin.*—We arrived at the mine on the morning of the 31st, and commenced coaling, but owing to high winds and a rough sea this was attended with many difficulties, and but slow progress was made. At times we were compelled to stop coaling entirely, the wind blowing so hard that the boats could not pull back and forth. The boats were moored stern to the beach, just clear of the breakers, and the coal, after being sacked, was carried out by the men through the breakers. In this way we succeeded in getting some 15 tons, working until the surf became so heavy that the men could not make way against it, being frequently washed back upon the beach, coal and all."

[Extract from report of Lieutenant-Commander H. E. Nichols, U. S. Navy, September 26, 1885.]

That part of Coal Report on "Coal in Alaska," as far as regards southeastern Alaska, is full of misleading statements and inaccuracies.

In 1868, the United States steamer *Saginaw* worked a cropping of bituminous coal of fair quality at the head of Kootzmahoo Inlet, Admiralty Island. This cropping was a small vein below high water, but only a small quantity was taken out for the use of the ship, and with her departure the mine was abandoned. There are other croppings of coal, of excellent quality, at the head of Kootzmahoo Inlet, but below high water. Owing to the difficulties of working in the heavy timber, no active search has yet been made for such croppings as will pay to work or prospect for the mother vein.

Near Point Gardner, on Admiralty Island, are large croppings of excellent quality. During the past year, several tunnels have been run searching for the mother vein, but so far without success. It is probable that the work will be taken up again this coming winter.

The above is all that is known of coal on Admiralty Island, but the indications are of the strongest that the interior will be found to be an immense coal bed.

On Kuiu Island, at Port Camden, and near Port Hamilton, coal was reported in 1867, in small veins, and below high water, by Capt. J. W. White, U. S. R. M. No later reports on the locality have been made and no coal found. There are reports of coal on Kuprianoff Island, and at St. John's Bay, near Sitka, but they are not confirmed, and I doubt the existence of the latter.

There is no anthracite coal known in southeastern Alaska, and there has been no mine worked except as above stated.

I am not familiar with the coal deposits west of Cape Spencer, but I have every reason to believe that their extent and richness are very much over-estimated.

ALASKAN COAL.

The following analysis of coal from Kootzmahoo Inlet, Admiralty Island, was made by Prof. C. F. Chandler in 1884 :

Water	(at 100° C) ..	3.74
Volatile combustible matter		37.02
Fixed carbon		45.15
Ash		14.09
		100.00

Sulphur, = 0.72 per cent., distributed between the three last constituents.
 The coke is powdery and non-coherent.
 The ash is brown and white.
 Specific gravity, 1.45.

[Extract from report of Ensign D. G. Terrell, of the U. S. S. *Pinta*, Lieutenant-Commander J. S. Newell, U. S. Navy, commanding, February 8, 1888.]

In the summer of 1887 a company of Killisnoy and Sitka men was formed for the purpose of developing the deposit of coal on Admiralty Island. A tunnel was begun at the point where the *Saginaw* stopped work, and run inshore, following the vein. About 20 tons of clean coal were taken out, some of the lumps weighing as much as 70 pounds. The vein at the mouth of the tunnel was small, but increased in size as the tunnel was lengthened. After continuing the tunnel for about 100 feet, on practically the same level, the vein inclined upward and appeared again as surface croppings. At this point the vein had widened to nearly 8 feet, but the quality had greatly deteriorated.

Several additional tunnels were run in this locality in the same general direction, with similar results. On account of the lack of suitable machinery for prospecting under water, no attempt was made to prospect the vein under the inlet, and work was stopped for the season. The prospectors are sanguine of ultimate success, and will continue their efforts to locate the mother vein by boring or by sinking shafts.

Anthracite has recently been reported in the vicinity of Yakutat, but the report has not been confirmed.

III.

TESTS OF COAL.

TESTS OF COAL.

UNITED STATES.

	Grate surface, sq. ft.	Heating sur- face, sq. ft.	Calorimeter through tubes, sq. ft.	Pounds of coal per sq. ft. of grate.	Evaporation from and at 212° F.	Authority.
Anthracite:						
Blackbeath	36	1, 144	6. 157	13. 866	9. 332	Experimental Researches in Steam Engineering.—Ish- erwood.
Do.....	36	952	4. 759	12. 444	8. 337	Do.
Do.....	36	856	4. 104	13. 084	9. 444	Do.
Do.....	36	760	3. 420	12. 857	9. 573	Do.
Do.....	47½	1, 484	6. 000	11. 383	10. 399	Do.
Do.....	41½	1, 057	5. 363	10. 744	10. 345	Do.
Do.....	58½	1, 303	10. 000	8. 163	12. 044	Do.
Do.....	58½	1, 303	10. 000	7. 917	11. 547	Do.
Do.....	58½	1, 303	10. 000	11. 636	11. 060	Do.
Do.....	58½	1, 303	10. 000	10. 363	10. 412	Do.
Boston.....	36	1, 144	6. 157	12. 609	8. 802	Do.
Broad Mountain.....	36	1, 144	6. 157	11. 911	8. 229	Do.
Conneil Ridge.....	36	1, 144	6. 157	12. 626	9. 652	Do.
Hazleton.....	36	1, 144	6. 157	12. 974	8. 853	Do.
Lackawanna.....	36	1, 144	6. 157	12. 501	9. 225	Do.
Do.....	36	1, 144	6. 157	12. 753	9. 054	Do.
Lehigh.....	90	2, 690	28. 33	11. 411	8. 250	Do.
Locust Mountain.....	36	1, 144	6. 157	12. 710	8. 685	Do.
Do.....	36			11. 611	8. 418	Do.
Do.....	36	952	4. 789	13. 333	8. 945	Do.
Do.....	36	856	4. 104	9. 816	9. 773	Do.
Do.....	36	760	3. 420	10. 500	9. 889	Do.
Pittston.....	36	1, 144	6. 157	12. 338	8. 628	Do.
Scranton.....	36			12. 199	8. 379	Do.
Schuylkill County.....	47½	981	6. 131	11. 346	8. 666	Do.
Spring Mountain.....	36	1, 144	6. 157	11. 185	9. 176	Do.
Susquehanna, Harvey's mine.....	75. 9	1, 818	12. 500	11. 165	9. 977	Do.
Susquehanna Valley.....	78½	2, 374	12. 444	11. 041	9. 363	Do.
Semi-bituminous:						
Broad Top, Pa.....	58½	1, 303	10. 000	11. 624	10. 321	Do.
Do.....	58½	1, 303	10. 000	11. 686	10. 484	Do.
Do.....	36	1, 144	6. 157	10. 939	9. 974	Do.
Ormsby, Pa.....	90	2, 690	28. 33	4. 406	9. 442	Do.
Do.....	90	2, 690	28. 33	7. 833	9. 143	Do.
Do.....	90	2, 690	28. 33	12. 192	8. 987	Do.
Do.....	90	2, 690	28. 33	22. 956	8. 809	Do.
Brookfield, Pa.....	90	2, 690	28. 33	18. 522	8. 297	Do.
Glen Carbon, Pa.....	36	1, 144	6. 157	14. 001	9. 208	Do.
Cumberland, Md.....	78½	2, 374	12. 442	11. 516	9. 297	Do.
Do.....	40	954	4. 903	11. 974	10. 043	Do.
Do.....	99½	2, 060	11. 5	9. 454	8. 726	Do.
Cumberland, Md., George's Creek.....	36	1, 144	6. 157	10. 977	10. 285	Do.
Do.....	75. 9	1, 818	12. 5	11. 031	10. 738	Do.
Cumberland, Md.....	21	687. 3	5. 3	10	9. 11	Experiments at Washington navy-yard, 1886.
Do.....	21	687. 3	5. 3	12. 5	9. 11	Do.
Do.....	21	687. 3	5. 3	15	9. 93	Do.
Do.....	21	687. 3	5. 3	17. 5	9. 50	Do.
Do.....	21	687. 3	5. 3	22. 5	7. 29	Do.
Do.....	21	687. 3	5. 3	27. 5	8. 24	Do.
Do.....	21	687. 3	5. 3	30	7. 49	Do.
Do.....	21	687. 3	5. 3	32. 5	7. 79	Do.
Do.....	21	687. 3	5. 3	35. 0	7. 23	Do.
Do.....	21	687. 3	5. 3	37. 5	7. 24	Do.
Do.....	21	687. 3	5. 3	40	6. 61	Do.
Do.....	21	687. 3	5. 3	42. 5	6. 12	Do.
Do.....	21	687. 3	5. 3	45	6. 25	Do.
Do.....	21	687. 3	5. 3	50	5. 51	Do.
Frostburg, Md.....	30	960	6. 75	7. 820	10. 336	Report of Board of Naval Engineers, 1878.
Do.....	30	960	6. 75	11. 634	9. 936	Do.
Do.....	30	960	6. 75	13. 987	9. 601	Do.
New River, W. Va.....	30	960	6. 75	7. 990	10. 959	Do.
Do.....	30	960	6. 75	13. 033	10. 202	Do.
Do.....	30	960	6. 75	14. 366	10. 139	Do.

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TESTS OF COAL—Continued.

UNITED STATES—Continued.

	Grate surface, sq. ft.	Heating sur- face, sq. ft.	Calorimeter throug h tubes, sq. ft.	Pounds of coal per sq. ft. of grate.	Evaporation from and at 212° F.	Authority.
Splint:						
Kanawha, W. Va	30	960	6.75	7.872	9.980	Report of Board of Naval Engineers. 1878.
Do	30	960	6.75	12.977	9.481	Do.
Do	30	960	6.75	21.215	7.582	Do.
Bituminous:						
Eagleton, Pa.	36	1,144	6.157	12.429	9.307	Experimental Researches in Steam Engineering.—Isler- wood.
Black Diamond, Wash*	21.25	.....	.....	.....	6.22	Mr. A. Worthington; tests at Genesee Mills, San Francisco, 1883.
Renton (screening), Wash.	21.25	.....	.....	.....	6.77	Do.
Seattle (screening), Wash.	21.25	.....	.....	.....	6.78	Do.
Do	21.25	.....	.....	.....	7.69	Do.
Seattle (lump), Wash.	21.25	.....	.....	.....	7.61	Do.
South Prairie, Wash.	21.25	.....	.....	28.9	8.88	Do.

* These tests were made with a 136 horse-power Babcock & Wilcox boiler. The heating is probably at least forty times the grate surface.

WELSH.

	Grate surface, sq. ft.	Heating surface, sq. ft.	Pounds of coal persquare foot of grate.	Evaporation from and at 212° F.	Authority.
Nixon's Navigation	37.9	1,084	21.70	9.915	Ger. Adm'y tests, 1874-'85.
Do	26.25	1,116	88.50	8.566	Mr. F. C. Marshall, 1886.
Do	18.9	618	96.03	7.15	British Admiralty tests with Thornycroft torpedo-boat boiler, 1880.
Do	18.9	618	78.90	7.60	Do.
Do	18.9	618	62.20	7.90	Do.
Do	18.9	618	49.00	8.49	Do.
Thomas Merthyr	37.9	1,084	17.44	10.166	German tests, 1874-'77.
Nant Melyne Merthyr	37.9	1,084	16.13	9.692	Do.
Blaen-avon	37.9	1,084	18.40	9.908	Do.
Cwm-aman Merthyr, Aberdare ..	37.9	1,084	20.60	10.123	Do.
Fothergill's, Aberdare .....	.....	.....	24.17	10.690	British Adm'y tests, 1874-'77.
Globe Merthyr .....	.....	.....	22.13	10.780	Do.
Do .....	.....	.....	23.50	10.512	Do.
Do .....	.....	.....	24.17	10.646	Do.
Hood's Merthyr .....	.....	.....	24.17	10.925	Do.
Taylor's Merthyr .....	.....	.....	23.01	11.003	Do.
Do .....	.....	.....	23.66	11.069	Do.
Do .....	.....	.....	24.23	11.069	Do.
Radford's Navigation	15.3	711	18.3	11.330	Rich & Samesdy.
Powell's Duffryn	2.63	211.5	11.97	12.96	Engineering, Nov. 18, 1887. Report of Messrs. Bram- well & Anderson.
Do	2.63	192.5	12.98	12.26	Do.
Do	3.39	218.1	13.44	12.27	Do.
Do	3.39	218.1	13.47	12.59	Do.
Do	4.18	167.7	20.91	10.14	Do.
Do	4.32	226.7	8.71	12.99	Do.
Do	4.69	238.1	9.39	11.21	Do.

TESTS OF COAL—Continued.

ENGLISH.

	Grate surface, sq. ft.	Heating surface, sq. ft.	Pounds of coal per square foot of grate.	Evaporation from and at 212° F.	Authority.
Cowpen Cambois Hartley .....	.....	.....	30.82	9.262	British Adm'y tests, 1876-'77.
Do	26.25	1,116	98.30	6.969	Mr. F. C. Marshall, 1886.
Do	26.25	1,116	107.90	6.889	Do.
Do	26.25	1,116	120.80	6.620	Do.
Do	26.25	1,116	118.10	6.566	Do.
Newcastle	37.9	1,084	23.14	8.634	German Adm'y test, 1875.
Roundwood Barnsley steam coal .....	.....	.....	24.30	9.831	British Adm'y tests, 1876-'77.
Do .....	.....	.....	24.70	9.708	Do.
Do .....	.....	.....	26.25	9.809	Do.
Longrigg Navigation .....	.....	.....	23.63	10.322	Do.
Do .....	.....	.....	24.17	10.300	Do.
Do .....	.....	.....	24.89	10.333	Do.
"Black Mine," Dukinfield Deep Pit... ..	99	8,390	15.19	9.720	Engineer, July 3 and 17, 1885.
Do	99	8,390	17.91	8.970	Do.

SCOTCH.

Loch Gelly	37.9	1,084	24.30	8.171	German Adm'y test, 1878.
Cannel	10.8	1,503	16.58	8.625	Isherwood.
Unknown	37.9	1,084	24.34	8.239	German Adm'y test, 1875.

WESTPHALIAN.

Mean of 60 tests of coal from ten mines	} 37.9	1,084	18.934	10.095	German Adm'y tests, 1874-'86.
Maximum—Wolfsbank mine, 4 tests...			18.914	10.470	Do.
Minimum—Verein Bonifacius mine, 4 tests.			20.637	9.847	Do.

AUSTRALIAN.

Waikato, N. Z., hand picked .....	.....	.....	44.80	7.439	British Adm'y tests, 1876-'77.
Waikato, N. Z., as supplied .....	.....	.....	40.48	7.458	Do.
Do .....	.....	.....	39.38	7.488	Do.
Wallsend or Newcastle, N. S. W.	} 37.9	1,084	18.719	8.691	German Adm'y test, 1876.
Tivoli (Gulland mine, Ipswich) from Brisbane, Queensland.			18.112	8.024	Do.

JAPANESE.*

Takasima	} 37.9	1,084	29.904	6.236	German Adm'y tests, 1875-'76.
Do			19.465	7.820	Do.

BRITISH COLUMBIAN.†

Wellington, screening	} 21.25			7.80	Mr. A. Worthington; tests at Genesee Mills, San Francisco, 1883.
Wellington, lump			28.2	9.30	
East Wellington, screening .....			.....	7.72	

* The best Japanese coal is Shin-bara, found on Kusu Island.

† These tests were made with a 136 horse-power Babcock & Wilcox boiler. The heating is probably at least forty times the grate surface.

TESTS OF COAL—Continued.

COMPRESSED FUEL.

	Grate surface, sq. ft.	Heating surface, sq. ft.	Pounds of coal per square foot of grate.	Evaporation from and at 212° F.	Authority.
Crown preserved fuel—Cardiff	37.9	1,084	21.58	8.734	German Adm'y test, 1875.
Crown preserved fuel—"Pumpquort"			23.01	9.340	British Adm'y tests, 1876-'77.
Do			21.88	9.270	Do.
Crown preserved fuel—"Nixon's Nav- igation"			24.00	10.534	Do.
Nixon's Navigation			23.63	10.378	Do.
Nixon, Tylor, and Cory			25.26	10.824	Do.
Grants Patent Cambrian			26.46	10.835	Do.
Imperial			24.00	10.300	Do.
Do			24.17	10.266	Do.
Do			22.13	10.724	Do.
Do			22.32	10.757	Do.
Compressed fuel from New Zealand coal			44.80	7.439	Do.
Do			40.48	7.468	Do.
Do			39.38	7.488	Do.
Briquettes from Westphalian coal: Mean of 29 tests—10 varieties	37.9	1,084	19.524	10.016	Ger. Adm'y tests, 1874-'86.
Max.—Franciska Tiefbau—1 test			18.900	10.470	
Min.—Wurmrevier zu Kohlscheid, 1 test			11.623	9.051	
Briquettes d'Anzin	70.9	3,264	41.09	9.85	French experiments with boiler of the <i>Marceau</i> , forced draft, 1885.
Do			51.19	9.77	
Do			61.43	9.468	
Do			60.96	9.636	

Rate of evaporation of coals and patent fuels.

Fuels.	Rate of evap- oration or pounds evap- orated per hour.	Weight per cubic foot.	Steam from water at 212° by 1 pound of fuel.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Coals:			
Welsh	448	53.1	9.05
Newcastle	411	49.8	8.37
Lancashire	448	49.7	7.94
Scotch	431	50.	7.7
Derbyshire	433	47.2	7.58
Patent fuel:			
Warlich's	458	69.	10.36
Livingstone's	484	65.6	10.03
Lyon's	409	61.1	9.58
Wylam's	419	65.1	8.92
Bell's	549	65.3	8.53

The following is a list of the varieties of Welsh and English coal purchased by the British Admiralty for use on Her Majesty's ships. They are divided into two classes, those marked 1 being decidedly better than those marked 2. The three varieties marked * are not shipped abroad, being too soft.

WELSH.

1. Ferndale.
1. Harris' Deep Navigation.
1. National Merthyr.
1. Nixon's Navigation.
1. Penrikyber.
1. Tylor's Merthyr.
2. Cambrian Navigation.
2. Cyfartha.
2. Dowlais Merthyr (Vochriw pits, Nos. 1 and 2, and Bedlinog pit only).
2. Globe Merthyr (Gelli pit).
2. Hill's Plymouth Merthyr.
2. Hood's Merthyr.
- *2. Lewis' Merthyr.

2. Locket's Merthyr.
2. Ocean Merthyr.
2. Pentre.
2. Powell's Duffryn.
- *2. Standard Merthyr.

ENGLISH (NORTH COUNTRY)

1. Cowpen Camboise Hartley.
1. Davison's West Hartley.
1. West Hartley Main.
2. Broomhill West Hartley (New Low Main).
2. Hasting's Hartley.
- *2. Wigan Hartley (Pearson & Knowles' Pemberton, 4-foot seam only).

Hitherto Scotch coal has not been used, but an order has recently (February, 1888) been given for several lots from the Slamannan district, with a view to its use should the tests prove satisfactory.

Production of coal in the United States in 1886.

States and Territories.	Quantity (short tons).	Value at mines.
Alabama	1,800,000	\$2,574,000
Arkansas	125,000	200,000
California	100,000	300,000
Colorado	1,368,338	3,215,594
Dakota	25,955	45,277
Georgia	223,000	384,500
Idaho	1,500	6,000
Illinois	9,246,436	10,263,543
Indiana	3,000,000	3,450,000
Indian Territory	534,380	855,328
Iowa	4,312,921	5,391,151
Kansas	1,400,000	1,680,000
Kentucky	1,550,000	1,782,500
Maryland	2,517,577	2,391,698
Michigan	60,434	90,651
Missouri	1,800,000	2,340,000
Montana	49,546	174,460
New Mexico	271,285	813,855
Ohio	8,435,211	8,013,450
Oregon	45,000	112,500
Pennsylvania (anthracite)	36,696,475	71,578,126
Pennsylvania (bituminous)	26,160,730	21,016,235
Tennessee	1,714,290	1,971,434
Texas	100,000	185,000
Utah	200,000	420,000
Virginia	684,951	684,951
Washington Territory	423,525	952,931
West Virginia	4,005,790	3,805,506
Wyoming	829,335	2,488,065
Total	107,681,679	147,186,755

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EXPLANATION OF SYMBOLS.

Under COAL—

C¹ = more than 1,000 tons.

C² = 500 to 1,000.

C³ = 100 to 500.

C⁰ = none.

Under DOCKS—

D¹ = for vessels 340 by 60 by 21 feet, or larger. *

D² = for vessels 270 by 50 by 18 feet, or larger. *

D³ = for vessels 210 by 40 by 15 feet, or larger. *

D⁴ = for vessels 150 by 30 by 12 feet, or larger. *

R¹ = marine railway for vessels of more than 2,000 tons.

R² = marine railway for vessels of 1,000 to 2,000 tons.

R³ = marine railway for vessels of 500 to 1,000 tons.

DR⁰ = neither dock nor marine railway.

Under MACHINERY-REPAIR FACILITIES—

M¹ = for building engines and boilers of high power.

M² = for ordinary repairs.

M³ = poor.

M⁰ = none.

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Aberdeen, Scotland.....	C ¹	D ³	M ¹	70
Acajutla, San Salvador.....	C ⁴	.....	.....	50
Acapulco, Mexico.....	C ¹	.....	M ²	50
Acheen, Sumatra.....	C ⁴	DR ⁰	M ³	66
Adelaide, South Australia.....	C ¹	R ²	M ¹	60
Aden, Arabia.....	C ¹	DR ⁰	M ³	106
Adra Marbella, Spain.....	C ³	DR ⁰	M ³	92
Akyab, India.....	C ²	DR ⁰	M ⁰	68
Albany, West Australia.....	C ¹	DR ⁰	M ⁰	60
Alexandretta, Syria.....	C ⁰	DR ⁰	M ⁰	104
Alexandria, Egypt.....	C ¹	D ²	M ²	106
Algeciras, Spain.....	C ⁰	DR ⁰	M ⁰	92
Algiers, Algeria.....	C ¹	D ¹	M ²	106
Alicante, Spain.....	C ²	DR ⁰	.....	92

* The three dimensions given are length, beam, and draught.

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Almeria, Spain (<i>see</i> Adra Marbella)	C ³	DR ⁰	M ³	92
Altata, Mexico	C ⁰	DR ⁰	M ²	50
Amapala, Honduras	C ⁰	DR ⁰	M ⁰	50
Amboina, Moluccas	C ³			66
Amherst, Magdalen Island, Gulf of St. Lawrence ...	C ³	DR ⁰		12
Amherstburg, Ontario				8
Amoy, China	C ¹	D ³	M ²	64
Amsterdam, Holland	C ¹	D ²	M ²	86
Anguilla, West Indies	C ⁰	DR ⁰	M ⁰	30
Annapolis, Nova Scotia	C ³	DR ⁰	M ²	16
Antigua, West Indies	C ⁰	DR ⁰	M ³	30
Antwerp, Belgium	C ¹	D ¹		86
Apia, Samoa	C ³	DR ⁰	M ⁰	56
Appledore, England		D ³		74
Aracaju, Brazil	C ⁰	DR ⁰	M ⁰	40
Ardrossan, Scotland		D ⁴		76
Arecibo, Porto Rico				28
Arendal, Norway	C ¹	DR ⁰	M ³	80
Arica, Chili				52
Arichat, Madame Island, Nova Scotia	C ⁰	DR ⁰	M ⁰	16
Ascension Island	C ¹			42
Aspinwall, United States of Colombia (<i>see</i> Colon) ..	C ¹	DR ⁰	M ²	34
Auckland, New Zealand	C ¹	D ³	M ¹	58
Ayr, Scotland	C ¹	R ¹	M ²	76
Azua, San Domingo				26
Bahia, Brazil	C ¹	DR ⁰	M ⁰	40
Bahia Blanca, Argentine Republic	C ¹	DR ⁰	M ⁰	42
Bahia Honda, Cuba	C ⁰	DR ⁰	M ⁰	22
Baltimore, Maryland	C ¹	D ¹	M ¹	20
Banana, Congo River	C ¹	DR ⁰	M ⁰	112
Banana Creek (<i>see</i> St. Paul de Loanda)				42
Bangkok, Siam	C ²	D ⁴	M ²	64
Baracoa, Cuba	C ³	DR ⁰	M ⁰	24
Barcelona, Spain	C ¹		M ²	94
Barcelona, Venezuela				36
Bari, Italy	C ¹	DR ⁰	M ²	98
Barranquilla, United States of Colombia	C ³	DR ⁰	M ⁰	36
Barrington, Nova Scotia				16
Barrow, England	C ¹	D ¹	M ¹	76
Bassein, Burmah	C ¹	DR ⁰	M ³	68
Basseterre, St. Kitt's, West Indies	C ⁰	DR ⁰	M ⁰	30
Bastia, Corsica				96

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Batavia, Java	C ¹	D ¹	M ²	66
Bathurst, West Africa				110
Beirut, Syria	C ¹	DR ⁰	M ³	104
Belfast, Ireland		D ³	M ¹	78
Belize, Honduras	C ⁰	DR ⁰		32
Belleville, Ontario	C ¹	DR ⁰	M ³	10
Benisaf, Algeria	C ²	DR ⁰	M ³	106
Bergen, Norway	C ¹	D ³	M ²	78
Bilbao, Spain	C ²	D ³	M ²	90
Bima, Sumbawa Island	C ³			66
Bluefields, Nicaragua	C ⁰	DR ⁰	M ⁰	34
Blyth, England	C ¹	D ⁴	M ¹	72
Boca del Toro, United States of Colombia	C ⁰	DR ⁰	M ³	34
Bombay, India	C ¹	D ¹	M ²	70
Bona, Algeria				106
Bordeaux, France	C ¹	D ¹	M ¹	90
Boston, Massachusetts	C ¹	D ¹	M ¹	18
Boulogne-sur-Mer, France		DR ⁰	M ⁰	86
Brake, Germany	C ²	D ¹	M ²	84
Bremerhaven, Germany	C ¹	D ²	M ¹	86
Brest, France	C ¹	D ¹	M ¹	88
Bridgetown, Barbadoes	C ¹	DR ⁰	M ²	32
Brisbane, Queensland	C ¹	D ²	M ²	58
Bristol, England	C ¹	D ³		74
Buenaventura, United States of Colombia	C ⁰	DR ⁰	M ⁰	52
Buenos Ayres, Argentine Republic	C ¹	D ^{4*}	M ²	40
Buffalo, New York	C ¹	D ³	M ¹	8
Burntisland, Scotland	C ¹	DR ⁰	M ⁰	70
Bushire, Persia	C ⁰	DR ⁰	M ⁰	70
Cabaños, Cuba	C ⁰			22
Cadiz, Spain	C ¹	D ¹	M ¹	92
Cagliari, Sardinia	C ¹	D ²	M ²	98
Calais, France	C ¹	DR ⁰	M ⁰	86
Calcutta, India	C ¹	D ²	M ²	68
Caldera, Chili	C ¹	DR ⁰	M ²	54
Callao, Peru	C ¹	D ²	M ²	52
Camden, New Jersey	C ¹	D ³	M ²	20
Cameroon, West Africa (<i>see</i> Fernando Po)				112
Campano, Venezuela				36
Cannes, France	C ¹			94
Canton, China	C ³	DR ⁰	M ⁰	64
Cape Canso, Nova Scotia	C ³	DR ⁰		16

* At San Fernando.

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Cape Coast Castle, Guinea				110
Cape Haytien, Hayti	C ³	DR ⁰	M ⁰	26
Cape Lisburne, Alaska	C ⁰	DR ⁰	M ⁰	46
Cape Town, South Africa	C ¹	D ¹	M ²	42
Carcenage, St. Bartholomew, West Indies				30
Cardenas, Cuba	C ¹	DR ⁰	M ³	24
Cardiff, Wales	C ¹	D ¹	M ¹	76
Carrickfergus, Ireland			M ²	78
Carrizal Bajo, Chili	C ²	DR ⁰	M ²	54
Cartagena, United States of Colombia	C ⁰	DR ⁰	M ⁰	34
Carthagena, Spain	C ¹	D ¹	M ²	92
Casa Blanca, Morocco				108
Castellamare, Italy	C ³			95
Castro, Island of Chios		DR ⁰	M ³	104
Catania, Italy	C ¹	DR ⁰	M ²	96
Cattaro, Austria	C ⁰			100
Cavite, Manila		R ²	M ³	64
Cayenne, French Guiana				38
Ceara, Brazil	C ³	DR ⁰	M ²	38
Cephalonia, Greece	C ¹	DR ⁰	M ⁰	100
Cette, France	C ¹	DR ⁰	M ³	94
Chagos Archipelago (<i>see</i> Diego Garcia)	C ¹	DR ⁰	M ⁰	46
Charleston, South Carolina	C ¹	D ⁴	M ²	20
Charlottetown, Prince Edward Island	C ⁰	DR ⁰	M ²	14
Chatham, England		D ¹	M ¹	72
Chatham, Ontario		D ⁴	M ³	10
Chefoo, China	C ¹	DR ⁰	M ⁰	62
Chemulpo, Corea	C ⁰			62
Cherbourg, France		D ¹	M ²	88
Chicago, Illinois	C ¹	D ³	M ¹	8
Chimbote, Peru		DR ⁰	M ⁰	52
Chin-Kiang, China	C ¹	DR ⁰	M ⁰	62
Chittagong, India	C ³	DR ⁰	M ⁰	68
Christiania, Norway	C ¹	D ⁴	M ¹	80
Christiansand, Norway	C ¹	D ³	M ²	80
Christiansted, Santa Cruz, West Indies	C ²	DR ⁰		28
Cienfuegos, Cuba	C ¹	R ³	M ³	26
Cindad Bolivar, Venezuela				36
Civita Vecchia, Italy	C ¹	DR ⁰	M ²	96
Cleveland, Ohio	C ¹	D ³	M ¹	8
Cobija, Chili				54
Coburg, Ontario	C ¹	DR ⁰	M ²	10

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Collingwood, Ontario	C ²	D ²	M ²	8
Colombo, Ceylon	C ¹	DR ⁰	M ³	70
Colon, United States of Colombia	C ¹	DR ⁰	M ²	34
Colonia, Uruguay	C ⁰	DR ⁰	M ⁰	40
Congo River (<i>see</i> Banana)				112
Constantinople, Turkey	C ¹	D ¹	M ²	102
Coos Bay, Oregon	C ¹	DR ⁰	M ⁰	48
Copenhagen, Denmark	C ¹	D ²	M ¹	84
Coquimbo, Chili	C ¹	DR ⁰	M ²	54
Corfu, Greece	C ¹	LR ⁰	M ³	100
Corinto, Nicaragua	C ³	DR ⁰	M ⁰	50
Cork, Ireland	C ¹	D ²	M ²	78
Cornwallis, Nova Scotia				16
Corral, Chili				54
Corunna, Spain	C ¹	DR ⁰	M ⁰	90
Cow Bay, Nova Scotia	C ¹	DR ⁰	M ⁰	14
Cronstadt, Russia	C ¹	D ¹	M ²	82
Cumana, Venezuela				36
Curaçao, West Indies	C ³	DR ⁰	M ⁰	32
Cuxhaven, Germany	C ³	DR ⁰	M ⁰	84
Dakar, Senegambia	C ¹			110
Dantzic, Germany	C ¹	D ³	M ¹	82
Dardanelles, Turkey	C ¹	DR ⁰	M ³	102
Deli, Sumatra	C ⁰	DR ⁰	M ⁰	66
Demerara, British Guiana	C ¹	D ⁴	M ²	38
Denia, Spain	C ⁰	DR ⁰	M ⁰	92
Departure Bay, Vancouver Island	C ¹	DR ⁰	M ⁰	46
Desterro, Brazil	C ⁰	DR ⁰	M ⁰	40
Detroit, Michigan		D ³	M ¹	8
Devonport, England		D ¹		74
Diego Garcia, Chagos Archipelago	C ¹	D ¹	M ⁰	46
Diego Suarez, Madagascar (<i>see</i> Hellville)				44
Dieppe, France	C ¹	DR ⁰	M ⁰	86
Digby, Nova Scotia	C ⁰	DR ⁰	M ⁰	16
Dublin, Ireland		D ³	M ²	78
Dumbarton, Scotland	C ¹	D ³	M ¹	78
Dundee, Scotland	C ¹	D ²	M ¹	70
Dunedin, New Zealand	C ¹	D ³	M ¹	58
Dunkirk, France	C ²	DR ⁰	M ⁰	86
Durban, South Africa	C ¹	DR ⁰	M ²	44
East London, South Africa				42
Elmira, Guinea	C ³			110

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Elsinore, Denmark	C ¹	D ⁴	M ²	84
Ergasteria, Greece	C ¹	DR ⁰	M ⁰	102
Erie, Pennsylvania	C ¹	DR ⁰	M ²	8
Esquimault, Vancouver Island	C ¹	D ¹		46
Eten, Peru	C ⁰	DR ⁰	M ⁰	52
Falmouth, England	C ¹	D ¹	M ¹	74
Fayal, Azores (<i>see</i> Horta)	C ²	DR ⁰	M ²	108
Fenérive, Madagascar	C ⁰	DR ⁰	M ⁰	44
Fernando Po, Gulf of Guinea	C ²			112
Ferrol, Spain	C ¹	D ¹	M ¹	90
Finme, Austria	C ¹	DR ⁰	M ⁰	100
Flushing, Holland	C ²	D ³	M ¹	86
Foo-Chow, China	C ²	D ²	M ²	64
Fort de France, Martinique, West Indies	C ¹	D ¹	M ²	30
Fredericksted, Santa Cruz, West Indies	C ³	DR ⁰	M ⁰	28
Freetown, Sierra Leone	C ¹	DR ⁰	M ⁰	110
Funchal, Madeira	C ¹	DR ⁰	M ³	103
Gaboon River (<i>see</i> Libreville)				112
Galveston, Texas	C ¹	DR ⁰	M ²	22
Gaspé Basin, Quebec	C ³			12
Gefle, Sweden	C ¹	DR ⁰	M ²	80
Genoa, Italy	C ¹	D ²	M ¹	96
Georgetown, Demerara	C ¹	D ⁴	M ²	38
Georgetown, Prince Edward Island	C ⁰	DR ⁰	M ⁰	14
Gibraltar, Spain	C ¹	DR ⁰	M ²	92
Gijon, Spain				90
Girgenti, Sicily	C ¹	DR ⁰	M ⁰	98
Glasgow, Scotland	C ¹	D ¹	M ¹	78
Gonaives, Hayti				26
Gothenburg, Sweden	C ¹	D ²	M ²	80
Graciosa, Azores	C ⁰	DR ⁰	M ⁰	108
Grao de Valencia, Spain	C ¹	DR ⁰	M ²	92
Gravosa, Austria (<i>see</i> Cattaro)				100
Great Corn Island, Central America	C ⁰	DR ⁰	M ⁰	34
Greenock, Scotland	C ¹	D ¹	M ¹	76
Greytown, Nicaragua	C ⁰	DR ⁰	M ⁰	34
Grimsby, England		D ¹		72
Guantanamo, Cuba	C ⁰	DR ⁰	M ⁰	24
Guayama, Porto Rico				28
Gnayaquil, Ecuador	C ⁰	DR ⁰	M ³	52
Gnaymas, Mexico	C ¹	DR ⁰	M ⁰	52
Guernsey, Channel Island	C ¹		M ⁰	88

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Haifa, Syria.....	C ⁰	DR ⁰	M ⁰	104
Hakodate, Japan.....				60
Halifax, Nova Scotia.....	C ¹	R ¹	M ²	18
Hamilton, Bermuda.....	C ¹	D ¹	M ²	22
Hamilton, Ontario.....				10
Hamburg, Germany.....	C ¹	D ²	M ²	84
Hankow, China.....	C ⁰	DR ⁰	M ⁰	62
Harbor Grace, Newfoundland.....		DR ⁰		12
Havana, Cuba.....	C ¹	D ³	M ²	24
Havre, France.....	C ¹	D ¹	M ²	86
Hellville, Madagascar.....	C ¹	DR ⁰	M ⁰	44
Helsingburg, Denmark (<i>see</i> Elsinore).....				84
Helsingfors, Russia.....	C ¹	D ²	M ²	82
Hilo, Hawaii.....	C ³	DR ⁰	M ⁰	56
Hioga, Japan.....	C ¹	D ⁴	M ²	60
Hobart Town, Tasmania.....	C ²	R ²	M ³	58
Hoikow, Hainan.....				64
Holyhead, Wales.....	C ¹	D ¹		76
Honfleur, France.....	C ¹	DR ⁰	M ³	88
Hong-Kong, China.....	C ¹	D ¹	M ¹	64
Honolulu, Hawaii.....	C ¹	R ²	M ²	56
Horta (Fayal), Azores.....	C ²	DR ⁰	M ²	108
Horten, Norway.....		D ¹		80
Huasco, Chili.....	C ⁰			54
Huelva, Spain.....		DR ⁰	M ²	90
Hull, England.....	C ¹	D ¹	M ¹	72
Ichang, China.....	C ⁰	DR ⁰	M ⁰	62
Iquique, Chili.....	C ¹	DR ⁰	M ²	52
Jaffa, Syria.....	C ²	DR ⁰	M ⁰	104
Jaffna, Ceylon.....				68
Jaluit, Marshall Island.....				56
Jamestown, Ponapi, Caroline Islands.....	C ³	DR ⁰	M ⁰	56
Jamestown, St. Helena.....	C ³	DR ⁰	M ⁰	42
Jelli-Koffe, West Africa (<i>see</i> Cape Coast Castle).....				110
Jeremie, Hayti.....				26
Jersey, Channel Islands.....	C ²	DR ⁰	M ³	88
Jersey City, New Jersey.....	C ¹	D ⁴	M ²	20
Johanna Island, Comoro Group.....	C ⁰	DR ⁰	M ⁰	44
Kadiak (<i>see</i> Sitka).....				46
Karlskrona, Sweden.....		D ²		80
Keelung, Formosa.....	C ¹	DR ⁰	M ⁰	64
Keyham, England (<i>see</i> Devonport).....				74

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Key West, Florida.....	C ²	DR ⁰	M ²	22
Kiel, Germany.....	C ¹	D ¹	M ¹	84
Kingston, Jamaica.....	C ¹	DR ⁰	M ²	26
Kingston, Ontario.....	C ²	DR ⁰	M ²	10
Kin-Kiang, China.....	C ⁰	DR ⁰	M ⁰	62
Königsberg, Germany.....	C ¹	DR ⁰	M ³	82
Kotei, Borneo.....		DR ⁰		66
Kurrachee, India.....	C ¹		M ²	70
Labuan Island.....				64
Lagos, West Africa.....				112
Laguayra, Venezuela.....	C ⁰	DR ⁰	M ⁰	38
Lahaina, Hawaii.....	C ⁰			56
La Libertad, San Salvador.....	C ⁰	DR ⁰	M ⁰	50
Las Palmas, Grand Canary Islands.....	C ¹	DR ⁰	M ³	110
Laraiche, Morocco.....				108
La Rochelle, France.....	C ¹	D ³	M ²	88
Latakia, Syria.....				104
Launceston, Tasmania.....				58
La Union, San Salvador.....	C ⁰	DR ⁰	M ⁰	50
Lebu, Chili.....	C ¹			54
Leghorn, Italy.....	C ¹	D ¹	M ¹	96
Leith, Scotland.....	C ¹	D ¹	M ¹	72
Levuka, Fiji Islands.....	C ³	DR ⁰	M ⁰	56
Libreville, Gaboon River.....	C ¹	DR ⁰	M ⁰	112
Licata, Sicily.....	C ¹	DR ⁰	M ⁰	98
Limasol, Cyprus.....	C ⁰	DR ⁰	M ⁰	104
Limerick, Ireland.....		D ³	M ²	78
Lingan, Nova Scotia.....				14
Lisbon, Portugal.....	C ¹	D ²	M ²	90
Liverpool, England.....	C ¹	D ¹	M ¹	76
Liverpool, Nova Scotia.....				18
Livingston, Guatemala.....	C ⁰	DR ⁰	M ⁰	32
Llanelly, Wales.....	C ¹	R ³	M ²	76
Lobos de Afuera, Peru.....	C ⁰	DR ⁰	M ⁰	52
London, England.....	C ¹	D ¹	M ¹	74
Londonderry, Ireland.....		D ³		78
L'Orient, France.....		D ¹	M ¹	88
Lota, Chili.....	C ¹	DR ⁰	M ²	54
Louisburg, Nova Scotia.....	C ¹	DR ⁰	M ⁰	14
Lübeck, Germany.....	C ¹	D ³	M ²	84
Lyttleton, New Zealand.....	C ¹	D ¹	M ²	58
Maceio, Brazil.....				38

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Madras, India	C ¹	DR ⁰	M ³	68
Mahé, Seychelles Islands	C ¹	DR ⁰	M ⁰	44
Malaga, Spain	C ¹	DR ⁰	M ²	92
Maldonado, Uruguay	C ⁰	DR ⁰	M ⁰	40
Malmo, Sweden	C ¹	D ⁴	M ²	80
Malta, Phillippine Islands	C ¹	D ¹	M ²	98
Mauila, Phillippine Islands	C ¹	R ²	M ³	64
Maracaibo, Venezuela	C ⁰	DR ⁰	M ⁰	36
Maranhao, Brazil	C ¹	DR ⁰	M ³	38
Mariel, Cuba	C ⁰	DR ⁰	.....	24
Marsala, Italy	C ³	DR ⁰	M ⁰	98
Marshall Islands (<i>see</i> Jaluit)				56
Marseilles, France	C ¹	D ¹	M ²	94
Matamoras, Mexico	C ⁰	DR ⁰	M ⁰	32
Matanzas, Cuba	C ¹	DR ⁰	M ⁰	24
Matapi, Henderson Island, New Britain	C ¹	DR ⁰	M ⁰	60
Mayaguez, Porto Rico	C ⁰	DR ⁰	M ⁰	28
Mayotte, Comoro Islands	C ²	DR ⁰	M ⁰	44
Mazagan, Morocco				108
Mazatlan, Mexico	C ¹	.....	M ²	50
Melbourne, Victoria	C ¹	D ¹	M ²	58
Mersina, Syria	C ⁰	DR ⁰	M ⁰	104
Medina, Sicily	C ¹	D ¹	M ³	96
Middleburg, Holland (<i>see</i> Flushing)		D ²	.....	86
Middlesborough, England		D ³	M ¹	72
Milford, Wales	C ³	D ³	.....	76
Milazzo, Sicily				98
Mobile, Alabama	C ¹	.....	M ²	22
Mochima, Venezuela	C ⁰	DR ⁰	M ⁰	36
Mogador, Morocco				108
Mojunga, Madagascar	C ⁰	DR ⁰	M ⁰	44
Monaco	C ⁰	DR ⁰	M ⁰	96
Monrovia, Liberia	C ⁰	DR ⁰	M ⁰	110
Montevideo, Uruguay	C ¹	D ²	M ²	40
Montreal, Quebec	C ¹	D ⁴	M ²	10
Montserrat, West Indies	C ⁰	DR ⁰	N ⁰	30
Mossel Bay, South Africa	C ³	DR ⁰	M ⁰	42
Monlmein, British Burmah		D ⁴	.....	68
Mourandara, Madagascar	C ⁰	DR ⁰	M ⁰	44
Mozambique, South Africa	C ¹	DR ⁰	M ⁰	44
Muscat, Arabia	C ⁰	.....	.....	106
Mytilene, Asia Minor	C ²	DR ⁰	M ⁰	104

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Nagasaki, Japan.....	C ¹	D ¹	M ³	60
Nanaimo, Vancouver Island.....	C ¹	DR ⁰	M ⁰	46
Nantes, France.....	C ¹			82
Naples, Italy.....	C ¹	D ³	M ¹	96
Naquaba, Porto Rico.....				28
Nassau, Bahama Islands.....	C ³	R ²	M ³	22
Natal, Brazil.....				38
Navao, Brazil.....	C ³	DR ⁰	M ³	38
Negapatam, India.....	C ¹	DR ⁰	M ³	62
Nei-Afu, Vavu Island, Tonga.....	G ⁰	DR ⁰	M ⁰	56
Nevis, West Indies.....	C ⁰	DR ⁰	M ⁰	30
Newcastle, New Brunswick.....	C ¹	DR ⁰	M ⁰	12
Newcastle, New South Wales.....	C ¹	R ³	M ²	58
Newcastle-on-Tyne, England.....	C ¹	D ¹	M ¹	72
New Chwang, China.....	C ³	DR ⁰	M ⁰	62
New London, Connecticut.....	C ¹	DR ⁰	M ³	18
New Orleans, Louisiana.....	C ¹	D ³	M ¹	22
Newport, England.....	C ¹	D ³	M ³	74
Newport, Rhode Island.....	C ¹	DR ⁰	M ³	18
Newport News, Virginia.....	C ¹	DR ⁰	M ⁰	20
New York, New York.....	C ¹	D ¹	M ¹	20
Nice, France (<i>see</i> Villefranche).....				94
Ningpo, China.....	C ¹	DR ⁰	M ⁰	62
Norfolk, Virginia.....	C ¹	D ²	M ¹	20
Nordenhamm, Germany.....	C ¹	DR ⁰	M ³	84
Norrköping, Sweden.....	C ¹	D ⁴	M ²	80
North Shields, England.....	C ¹	D ³	M ¹	72
North Sydney, Nova Scotia.....	C ¹	R ³	M ³	14
Nossi-Bé, Madagascar (<i>see</i> Hellville).....	C ¹	DR ⁰	M ⁰	44
Nouméa, New Caledonia.....				56
Nuevitas, Cuba.....	C ⁰	DR ⁰		24
Odessa, Russia.....	C ¹	DR ⁰	M ²	102
Olympia, Oregon.....		DR ⁰	M ⁰	48
Oporto, Portugal.....	C ¹			90
Oran, Algeria.....	C ¹	DR ⁰	M ²	106
Osaka, Japan (<i>see</i> Hiogo).....				60
Ounalaska, Alaska.....	C ²	DR ⁰	M ⁰	46
Owen Sound, Ontario.....	C ¹	D ³	M ²	8
Pacasmayo, Peru.....	C ⁰	DR ⁰	M ⁰	52
Padang, Snmatra.....	C ¹	DR ⁰	M ⁰	66
Pago Pago, Samoan Islands.....	C ¹	DR ⁰	M ⁰	56
Paimbœuf, France.....		D ³		88

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Palermo, Sicily	C ¹	DR ⁰	M ²	98
Palma, Spain.....	C ¹	DR ⁰	M ⁰	94
Panama, United States of Colombia	C ¹	DR ⁰	M ²	52
Papéiti, Tahiti, Society Islands.....	C ¹	DR ⁰	M ⁰	56
Para, Brazil	C ¹	DR ⁰	M ¹	38
Parahiba, Brazil.....	C ⁰	DR ⁰	M ⁰	38
Paramaribo, Dutch Guiana	C ³	DR ⁰	M ²	38
Parrsborough, Nova Scotia.....	C ²	DR ⁰	M ⁰	14
Patras, Greece	C ¹	DR ⁰	M ³	100
Paysandu, Uruguay.....	C ³	DR ⁰	M ⁰	40
Payta, Peru	C ¹	DR ⁰	M ⁰	52
Pearl Lagoon, Central America.....	C ⁰	DR ⁰	M ⁰	34
Pembroke, Wales	C ¹	D ¹		76
Penang, Malacca	C ¹	D ⁴	M ²	66
Pensacola, Florida.....	C ²	DR ⁰	M ²	22
Perim Island	C ¹	DR ⁰	M ⁰	106
Pernambuco, Brazil.....	C ¹	DR ⁰	M ²	38
Peterhead, Scotland		D ⁴		70
Petropaulovski, Russia	C ²	DR ⁰	M ⁰	60
Philadelphia, Pennsylvania	C ¹	D ²	M ¹	20
Pichilique Bay, Lower California	C ¹	DR ⁰	M ⁰	48
Pictou, Ontario.....	C ⁰	D ²	M ³	10
Pictou, Nova Scotia	C ¹	R ²	M ¹	16
Piræus, Greece	C ¹	DR ⁰	M ³	100
Plymouth, England	C ¹	D ²		74
Pointe-à-Pitre, Guadeloupe	C ⁰	DR ⁰	M ³	30
Point de Galle, Ceylon.....	C ¹	DR ⁰	M ³	70
Pola, Austria		D ¹	M ¹	100
Ponapi, Caroline Islands (<i>see</i> Jamestown).....	C ³	DR ⁰	M ⁰	56
Ponce, Porto Rico				28
Pondicherry, India	C ²			68
Portland, Maine	C ¹	D ³	M ¹	18
Portland, Oregon	C ¹	D ¹		48
Portsmouth, Dominica.....	C ⁰	DR ⁰	M ⁰	30
Portsmouth, England	C ¹	D ¹	M ¹	74
Portsmouth, New Hampshire.....	C ¹	D ¹	M ¹	18
Port Castries, St. Lucia, West Indies.....	C ¹	DR ⁰	M ⁰	32
Port Clarence, Alaska	C ²	DR ⁰	M ⁰	46
Port Elizabeth, South Africa.....	C ¹	DR ⁰	M ²	42
Port Hawkesbury, Nova Scotia.....	C ⁰	R ²		16
Port Hood, Nova Scotia.....	C ⁰	DR ⁰		14
Port Hope, Ontario.....	C ¹	DR ⁰	M ³	10

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Port Joggins, Nova Scotia	C ¹	DR ⁰	M ²	14
Port Limon, Costa Rica	C ³	DR ⁰	M ²	34
Port Louis, Mauritius	C ¹	D ²	M ²	46
Port Mahou, Minorca	C ¹	DR ⁰	M ⁰	94
Port Mulgrave, Nova Scotia	C ³	DR ⁰		16
Port Natal, South Africa	C ¹	DR ⁰	M ²	44
Port Nipe, Cuba	C ⁰	DR ⁰		24
Port au Prince, Hayti	C ³	DR ⁰	M ⁰	26
Port Royal, South Carolina	C ²	DR ⁰	M ⁰	22
Port Said, Egypt	C ¹	DR ⁰	M ²	104
Port Sarnia, Ontario	C ¹	DR ⁰	M ³	8
Port Spain, Trinidad	C ¹	DR ⁰	M ³	32
Port Stanley, Falkland Islands	C ¹	DR ⁰	M ⁰	42
Port Townsend, Washington Territory		DR ⁰	M ³	46
Porto Graude, Canary Islands	C ¹	DR ⁰	M ³	110
Porto Prayo, Cape Verde Islands	C ³	DR ⁰	M ⁰	110
Poti, Russia				102
Pozzuoli, Italy (<i>see</i> Naples)				96
Puerto Bello, United States of Colombia				34
Puerto Cabello, Honduras	C ⁰	DR ⁰	M ²	34
Puerto Cabello, Venezuela	C ³			36
Puerto Cortez, Honduras				34
Puerto Plata, San Domingo	C ⁰	DR ⁰	M ⁰	26
Pulo Brasse (<i>see</i> Acheen)				66
Pulo Laut, Borneo		DR ⁰		66
Punta Arenas, Chili (<i>see</i> Sandy Point)				54
Punta Arenas, Costa Rica	C ⁰	DR ⁰	M ⁰	50
Quebec, Quebec	C ¹	D ¹	M ¹	12
Queenstown, Ireland	C ¹	D ¹	M ²	78
Rabat, Morocco				108
Rangoon, India	C ¹	D ²	M ³	68
Revel, Russia	C ¹			82
Rhodes	C ⁰	DR ⁰	M ⁰	104
Riga, Russia	C ¹	R ²	M ²	82
Rio Caribe, Venezuela	C ⁰			36
Rio Grande do Sul, Brazil				4
Rio Hacha, United States of Colombia	C ³	DR ⁰	M ⁰	36
Rio de Janeiro, Brazil	C ¹	D ¹	M ²	40
Rochefort, France		D ⁴	M ²	88
Rodi, Italy	C ⁰	DR ⁰	M ⁰	98
Rønne, Denmark	C ¹	DR ⁰	M ²	82
Rosario, Argentine Republic	C ¹	DR ⁰	M ⁰	40

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Roseau, Dominica	C ⁰	DR ⁰	M ⁰	30
Rotterdam, Holland	C ¹	D ¹	M ¹	86
Roustchouk, Bulgaria	C ¹	.....	M ²	102
Russell, New Zealand	C ²	DR ⁰	M ²	56
Sabanilla, United States of Colombia	C ⁰	DR ⁰	M ⁰	36
Saffi, Morocco .....	.....	.....	.....	108
Sagua la Grande, Cuba .....	.....	.....	.....	24
Saigon, Cochin China .....	.....	D ²	.....	64
Sainte Marie de Madagascar	C ¹	DR ⁰	M ⁰	44
Salaverry, Peru	C ⁰	.....	.....	52
Sal Isle, Cape Verde Island	C ⁰	DR ⁰	M ⁰	110
Salonica, Turkey	C ¹	DR ⁰	M ⁰	102
Samana, San Domingo	C ⁰	DR ⁰	M ⁰	26
Sandy Point, Chili	C ¹	DR ⁰	M ⁰	54
Santander, Spain	C ⁰	DR ⁰	M ⁰	90
Santiago, Cape Verde Island	C ³	DR ⁰	M ⁰	110
Santiago de Cuba	C ¹	DR ⁰	M ²	24
Santos, Brazil	C ¹	DR ⁰	M ⁰	40
Sassebo, Japan	C ¹	DR ⁰	M ⁰	62
Savannah, Georgia	C ¹	D ³	M ²	22
Savona, Italy	C ¹	DR ⁰	M ³	96
San Blas, Mexico	C ⁰	DR ⁰	M ⁰	50
San Diego, California	C ¹	R ¹	.....	48
San Domingo, West Indies	C ⁰	DR ⁰	M ⁰	26
San Fernando, Argentine Republic (<i>see</i> Buenos Ayres) .....	.....	D ⁴	.....	40
San Francisco, California	C ¹	D ¹	M ¹	48
San José de Guatemala	C ⁰	DR ⁰	M ⁰	50
San Juan, Porto Rico	C ¹	DR ⁰	M ⁰	28
San Juan del Norte, Nicaragua	C ⁰	DR ⁰	M ⁰	34
San Juan del Sur, Nicaragua .....	.....	.....	.....	50
San Lucar, Spain	C ⁰	DR ⁰	M ⁰	92
San Nicolas, Hayti	C ⁰	DR ⁰	M ⁰	26
San Pedro, California .....	.....	.....	.....	48
San Sebastian, Spain .....	.....	.....	.....	90
Santa Ana, Curaçao	C ³	DR ⁰	M ⁰	32
Santa Cruz, Patagonia	C ⁰	.....	.....	42
Santa Cruz, Taneriffe	C ¹	DR ⁰	M ³	110
Santa Marta, United States of Colombia	C ⁰	DR ⁰	M ⁰	36
Scilly Islands, England	C ¹	DR ⁰	M ⁰	74
Seattle, Washington Territory	C ¹	DR ⁰	M ²	48
Sebastopol, Russia .....	.....	D ¹	M ¹	102
Sebenico, Austria (<i>see</i> Cattaro) .....	.....	.....	.....	100

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Steubal, Portugal.....	C ³			90
Seville, Spain	C ¹	DR ⁰	M ¹	92
Shanghai, China.....	C ¹	D ¹	M ¹	62
Sheerness, England.....		D ³	M ²	72
Shelburne, Nova Scotia				16
Shepherd's Harbor, United States of Colombia.....	C ⁰	DR ⁰	M ⁰	34
Sidon, Syria	C ⁰	DR ⁰	M ⁰	104
Sierra Leone (<i>see</i> Freetown).....				110
Simcoe, Ontario	C ⁰	DR ⁰	M ⁰	8
Simon's Town, South Africa.....	C ¹	R ²	M ²	42
Singapore, Malacca.....	C ¹	D ¹	M ²	66
Sitka, Alaska.....	C ²			46
Sligo, Ireland				78
Smyrna, Asia Minor	C ¹	DR ⁰	M ²	104
Söderhamn, Sweden	C ²	DR ⁰	M ⁰	82
Sorel, Quebec.....				10
Sourabaya, Java.....	C ¹	D ³	M ²	66
Southampton, England	C ¹	D ¹	M ¹	74
South Shields, England.....	C ¹	D ³	M ²	72
Spezzia, Italy	C ²	D ¹	M ¹	96
Stavanger, Norway	C ¹	D ⁴	M ²	80
Stettin, Germany	C ¹	D ³	M ¹	82
Stockholm, Sweden.....	C ¹	D ²	M ¹	80
St. Catherines Island, Brazil	C ⁰	DR ⁰	M ⁰	40
St. Catharines, Ontario	C ²	D ⁴	M ³	8
St. Christopher, West Indies (<i>see</i> Basseterre).....				30
St. Denis, Réunion Islands.....				46
St. Eustatius, West Indies				30
St. George's, Bermuda	C ²	R ²	M ³	22
St. Helena (<i>see</i> Jamestown)	C ³	DR ⁰	M ⁰	42
St. Hyacinthe, Quebec.....	C ⁰	DR ⁰	M ⁰	12
St. John, New Brunswick.....	C ¹	DR ⁰	M ²	18
St. John's, Newfoundland	C ¹	D ¹	M ²	12
St. Kitt's (<i>see</i> Basseterre).....				30
St. Malo, France.....	C ¹	DR ⁰	M ³	88
St. Marc, Hayti	C ⁰	DR ⁰	M ⁰	26
St. Martin, West Indies.....				30
St. Michael's, Azores.....	C ¹	D ⁴	M ²	108
St. Nazaire, France	C ¹	D ¹	M ¹	88
St. Paul de Loando, West Africa.....	C ¹	DR ⁰	M ³	42
St. Pierre, Miquelon Islands.....	C ²	DR ⁰	M ⁰	12
St. Pierre, Réunion Islands (<i>see</i> St. Denis).....				46

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
St. Stephen, New Brunswick.....	C ²	.....	M ⁰	18
St. Thomas, West Indies	C ¹	D ²	M ²	28
St. Vincent, Cape Verde Islands.....	C ⁰	DR ⁰	M ³	110
St. Vincent, West Indies.....	C ¹	DR ⁰	M ⁰	32
Suakim, Egypt.....	.....	.....	.....	106
Suez, Egypt.....	C ¹	D ¹	.....	106
Sulina, Turkey	C ¹	DR ⁰	.....	102
Summerside, Prince Edward Island	C ¹	DR ⁰	M ⁰	12
Sunderland, England.....	C ¹	D ³	M ¹	72
Sundsvall, Sweden.....	C ¹	DR ⁰	M ²	82
Supé, Peru	C ⁰	.....	.....	52
Suva, Fiji Islands .....	.....	.....	.....	56
Swansea, Wales	C ¹	D ³	M ²	76
Swatow, China.....	C ³	DR ⁰	M ⁰	64
Sydney, Nova Scotia.....	C ¹	DR ⁰	M ⁰	14
Sydney, New South Wales	C ¹	D ¹	M ¹	58
Syra, Greece.....	C ¹	.....	M ²	100
Syracuse, Sicily .....	.....	.....	.....	98
Tacoma, Washington Territory.....	C ¹	DR ⁰	M ²	48
Tahiti, Society Islands (<i>see</i> Papéiti).....	C ¹	DR ⁰	M ⁰	56
Talcahuano, Chili	C ³	DR ⁰	M ²	54
Taltal, Chili.....	C ⁰	.....	.....	54
Tamatave, Madagascar	C ⁰	DR ⁰	M ⁰	44
Tampico, Mexico	C ³	DR ⁰	M ³	32
Tamsui (<i>see</i> Keelung).....	.....	.....	.....	64
Tangier, Morocco.....	C ⁰	DR ⁰	M ⁰	108
Tarragona, Spain.....	C ¹	DR ⁰	M ⁰	94
Teneriffe (<i>see</i> Santa Cruz).....	C ¹	DR ⁰	M ³	110
Ternate, Moluccas	C ³	.....	.....	66
Tetuan, Morocco.....	.....	.....	.....	108
Three Rivers, Quebec.....	C ⁰	DR ⁰	M ⁰	10
Tientsin, China	C ¹	D ⁴	M ¹	62
Tilbury, England.....	C ¹	.....	.....	74
Tilt Cove, Newfoundland	C ³	.....	.....	12
Tocopilla, Chili.....	C ⁰	.....	.....	54
Toronto, Ontario .....	.....	.....	.....	10
Torre Vieja, Spain.....	C ⁰	DR ⁰	M ⁰	92
Toulon, France	C ¹	D ¹	M ¹	94
Trebizonde, Asiatic Turkey .....	.....	.....	.....	102
Trieste, Austria.....	C ¹	D ¹	M ¹	100
Trincomalee, Ceylon .....	.....	DR ⁰	M ²	70
Trinidad de Cuba.....	C ²	DR ⁰	M ⁰	24

Name of port.	Coal.	Docks.	Machinery- repair fa- cilities.	Page.
Tripoli, Syria	C ⁰	DR ⁰	M ⁰	104
Tripoli, Tripoli		DR ⁰		106
Truxillo, Honduras				52
Tullear, Madagascar	C ⁰	DR ⁰	M ⁰	44
Tumbez, Peru	C ⁰	DR ⁰	M ⁰	52
Tunis	C ²	DR ⁰		106
Turk's Island	C ⁰	DR ⁰	M ⁰	28
Tuxpan, Mexico				32
Valdivia, Chili			M ³	54
Valparaiso, Chili	C ¹	D ²	M ¹	54
Vathi, Island of Samos	C ⁰	DR ⁰	M ⁰	104
Vavu, Tonga (<i>see</i> Nei-Afu)	C ⁰	DR ⁰	M ⁰	56
Venice, Italy	C ¹	D ¹	M ¹	98
Vera Cruz, Mexico	C ¹	DR ⁰	M ²	32
Victoria, Vancouver	C ¹	DR ⁰	M ²	46
Viequez Island, Porto Rico				28
Vigo, Spain	C ¹	DR ⁰	M ⁰	90
Villefranche, France	C ¹	DR ⁰	M ²	94
Vladivostok, Russia	C ¹	DR ⁰		60
Waterford, Ireland	C ³	DR ⁰	M ³	78
Wellington, New Zealand	C ¹	R ¹	M ²	58
West Cowes, England		D ²		74
Westend, Belgium				86
West Hartlepool, England	C ¹	D ²	M ¹	72
Whangerei, New Zealand	C ²	DR ⁰	M ²	58
Wiborg, Russia	C ³	DR ⁰	M ⁰	82
Wilhelmshaven, Germany	C ¹	D ¹	M ¹	84
Wilmington, Delaware	C ¹	D ⁴	M ¹	20
Wilmington, North Carolina	C ¹	R ²	M ²	20
Windsor, Nova Scotia	C ²	DR ⁰	M ²	16
Windsor, Ontario				8
Yarmouth, Nova Scotia	C ¹	DR ⁰	M ²	14
Yokohama, Japan	C ¹	D ¹	M ¹	60
Yokosuka, Japan	C ⁰	D ¹	M ¹	60
Zante, Greece	C ¹	DR ⁰	M ⁰	100
Zanzibar, South Africa	C ¹	DR ⁰	M ⁰	44

